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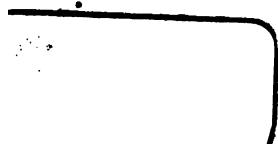
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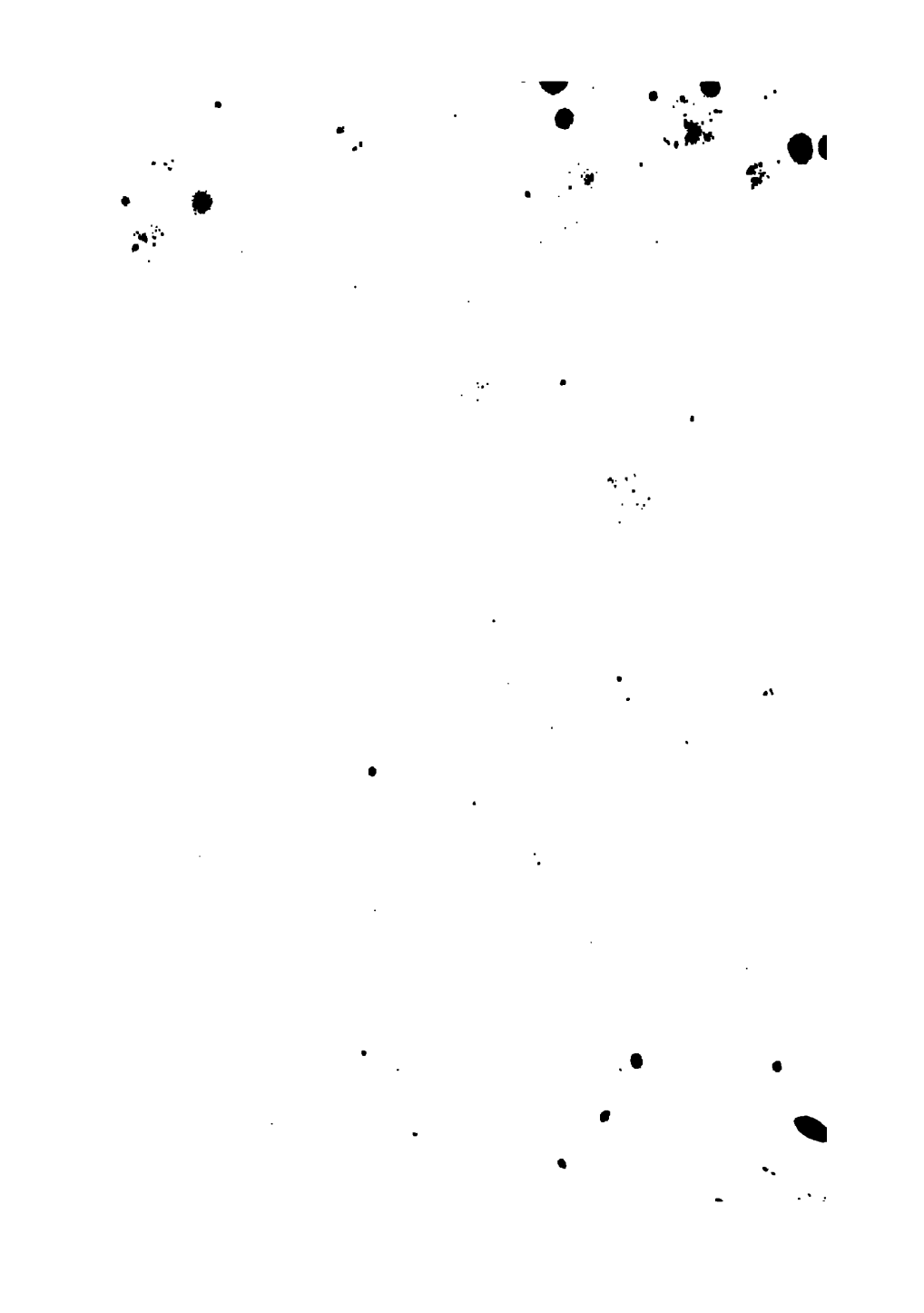


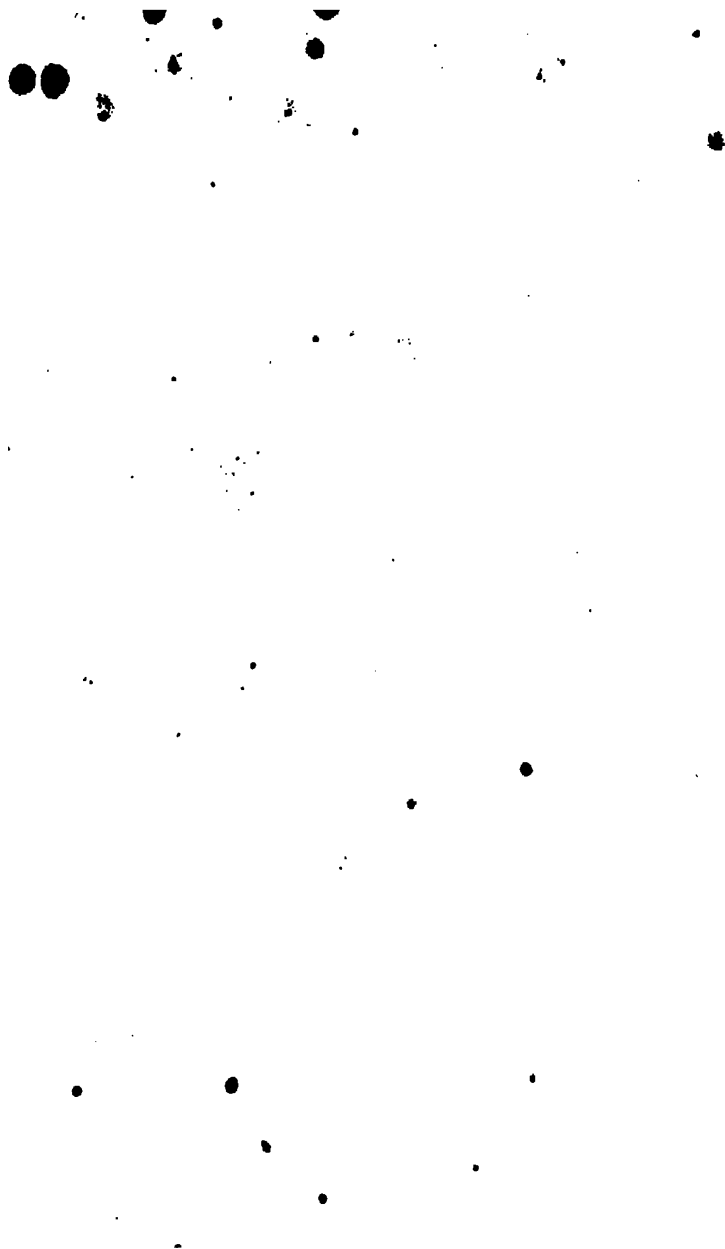


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pt. 79







PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

PURIFYING AND FILTERING WATER,

INCLUDING

THE DISTILLATION OF SEA WATER TO PRODUCE
FRESH WATER.

A.D. 1675-1866.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.



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1876.

PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embraces several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering therefore the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will from time to time become apparent and be supplied in future editions.

This volume contains Abridgments of Specifications to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological and Descriptive Index" (*see* List of Works at the end of this book). It is intended however to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

This series embraces all means, both mechanical and chemical, of purifying water for drinking and domestic purposes, whether by the use of filters, distilling apparatus, or chemical ingredients which cause a precipitation of extraneous matters held in solution or suspension.

The filters are restricted to those intended for purifying water. All other apparatus and processes, though often described as "filters" and "filtering," are omitted, as for example, sieves and other strainers for clearing infusions, decoctions, syrups, &c. from solid particles, or for separating and collecting the denser matters and allowing the more liquid to pass off; such will be found in series relating to the special manufactures for which they are intended, as "Brewing, Wine Making, and Distilling Alcoholic Liquids;" "Cooking and Confectionery;" "Manure" (filtration of sewage); "Pottery" (filtering "slip"); "Medicine" (medicinal tinctures and infusions); and others. The series of Abridgments relating to "Sugar" contains the processes and apparatus for "filtering" syrups, and likewise comprehends the manufacture and use of animal charcoal and its substitutes used for purposes of such filtration. Consequently such inventions have, as a rule, been omitted from the present volume.

Another class of inventions which are included embraces all *chemical* methods of purifying water for drinking and domestic purposes; but methods of treating water so as to prevent incrustation or "furring" in boilers are excluded, and will be found in the series devoted to the "Steam Engine;" inventions for "softening" water for household use will be found herein, but for washing powders claiming to be used for softening water reference should be made to the series relating to "Bleaching, Dyeing, and Printing;" inventions relating to purifying sewage water by precipitating matters held in suspension or solution are omitted, but are contained in the series relating to "Manure."

The other inventions inserted in this volume describe apparatus for obtaining pure water by distillation from salt water, or water containing mineral or other matter in solution or suspension; but inventions designed for feeding marine boilers with fresh water obtained by condensing waste steam or by distillation are excluded, and will be found in the "Steam Engine" series. A few inventions are likewise included for rendering distilled or other unpalatable water less objectionable for drinking purposes, but not inventions for the manufacture of effervescent aerated waters.

June, 1876.

H. READER LACK.

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PURIFYING AND FILTERING WATER,

INCLUDING

THE DISTILLATION OF SEA WATER TO PRODUCE
FRESH WATER.

A.D. 1675, October 28.—No. 184.

WALCOTT, WILLIAM.—“Art of makeing water corrupted
“ fitt for vse, and sea water fresh, cleare, and wholesome in
“ very large quantities, by such wayes and means as are very
“ cheap and easy, and which may bee done and practised with
“ great speed and expediçon.”

No explanation of the process is given; but as regards its
success it is said, “some evident demonstraçons whereof we
“ have seen to our great satisfacçon, and doe beleive the same
“ may prove very vsefull as well to our royal navy as alsoe to
“ all other shippes and vessells belonging to our subjects, and
“ likewise highly advantageous to the trade of our subjects,
“ and may tend to the advancement of our customes.” The
Letters Patent were granted for the term of fourteen years,
without any stipulation respecting an annual payment to the
Crown.

[No Specification enrolled. Signet Bill printed, price 4*d*.]

A.D. 1683, June 9.—No. 226.

FTZGERALD, ROBERT, OGLETHORPE, THEOPHILUS,
BRIDGEMAN, WILLIAM, TRANT, PATRICK, and MAULE,
THOMAS.—“A way to render salt or brackish water sweet and
“ fitt for drinking, boyling meate, washing, or any other
“ ordinary vse, by the means of a certaine engine or engines
“ not heretofore used or practised in our dominions.”

No detailed account of the engine or engines is contained in
the Letters Patent. The invention is represented likely to

prove "of great and public vse, both at land and sea" "itt
 " being to be putt in vse and practise with great ease and
 " safety on shipp board, and soe as to supply the seamen with
 " sufficient quantities of good and wholesome water from
 " time to time." The grant was made for a term of fourteen
 years, and free from the reservation of an annual payment.

[No Specification enrolled. Letters Patent printed, *4d.*]

A.D. 1770, December 6.—No. 972.

DOMINICETI, BARTHOLOMEW.—This invention consists of a great number of particulars. Amongst others are, a fire stove with cooking utensils, together with a heat-giving apparatus called the economist. With the same fire as that employed in cooking, sea water may be made fresh and fowl water clean. Baths and other domestic arrangements are set forth; also apparatus for the administration of medicinal vapours are described.

The arrangement for distillation has the same stove as "the great economical machines." The liquor to be distilled is placed in a vessel that supplies a cauldron which is made to communicate, successively, with the several alembics that constitute the distilling arrangement. The several alembics communicate so that first, second and third distillations can be accomplished, in succession, by means of the same source of heat. Between each alembic and the succeeding one there is a cooling vessel, and, finally, the resulting distilled water falls into a tub for its collection. The cooling vessels are supplied from an upper cistern, by separate pipes, one to each cooling vessel. The cooling water, after it has acted as a condensing agent, flows into the well from which the upper cistern is supplied by means of a pump.

[Printed, 1s. 4d. Drawing.]

A.D. 1777, July 19.—No. 1163.

BAILEY, ALEXANDER MABYN.—"A machine for making fresh
 " water from sea water or brine springs without boiling, which
 " will be pure element without spirit of salt, bitumen, hete-
 " rogenous matter, and for making salt from sea water, or
 " from brine springs, with much less boiling than in the
 " common way of boiling it."

"This machine consists of five parts, vizt:—First, a large
 " pair of bellows on a strong frame. Secondly, an iron stove

“ with a tube or pipe, which conveys the air (from the bellows) through the fire into a dodecagon frame (or barrel). Thirdly, an iron pan with a groove (or channel) on its upper edge to receive the cover (or condenser), and with a pipe at the bottom of it to draw off the salt water when needful. Fourthly, the dodecagon frame (or barrel) covered with flannel (or coarse canvas), which revolves on two concave cylinders, the one to convey the hot air from the stove into the dodecagon frame (or barrel), the other is to let out the air occasionally. Fifthly, the cover (or condenser), with a groove (or channel) on its inside to convey off the fresh water; on its outside is a pipe which communicates to the groove (or channel aforesaid); the upper part of it has a conic roof, and is a reservoir of salt water to supply the pan when wanted. This machine may be worked by hand, horse, wind or water.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 5, p. 320.]

A.D. 1790, October 16.—No. 1776.

HEMPEL, JOHANNA. — A “composition made of earth and other materials, and the means of manufacturing the same into basons and other vessels, which so manufactured hath the power of filtering water and other liquids in a more cheap, easy, and convenient manner than water or other liquids could then be filtered.”

“The basons or other vessels are formed, moulded, thrown, or turned in a potter’s wheel, according to the shape or size of the basons or other vessels, oval, round, or otherwise, with or without a cover; likewise with or without a rim or border round the edge, whereby the same may be hung, sustained, or rested in or on a frame, or other suitable or convenient stand or vessel.” Four different compositions for making these filtering basins are specified:—1st. “Four equal parts out of nine equal parts of tobacco-pipe clay, and five equal parts out of nine equal parts of coarse sea, river, drift, or pit sand.” 2nd. “Equal parts of tobacco-pipe clay, and coarse sea, river, drift, or pit sand.” 3rd. “Three equal parts out of nine equal parts of tobacco-pipe clay, one equal part out of nine equal parts of Stour-bridge clay, or clay from the surface of coal mines, or any other clay of the same quality, one equal part out of nine

“equal parts of Windsor or other loam of the same quality
 “with Windsor loam, and four equal parts out of nine equal
 “parts of coarse river, sea, drift, or pit sand.” 4th. “Four
 “equal parts out of eight equal parts of tobacco-pipe clay,
 “three equal parts out of eight equal parts of coarse sea,
 “river, drift, or pit sand, and one equal part out of eight equal
 “parts of that burnt ground clay of which crucibles are
 “made.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 2, p. 230; and
 Rolls Chapel Reports, 6th Report, p. 183.]

A.D. 1791, December 23.—No. 1844.

PEACOCK, JAMES.—“A new method for the filtration of
 “water and other fluids, which would be of great public and
 “private utility.”

“My method for the filtration of water and other fluids is by
 “impelling the ascent of the fluid through the filtering medium
 “instead of the common method by descent. It is applicable
 “to all heads or bodies of water of various magnitudes or
 “extents, and also to all reservoirs and cisterns of water or
 “other fluids by which it is adapted for public service as well
 “and also for private use. The medium of filtration may
 “consist of particles of sand, sandy gravel, broken or pulver-
 “ized glass, or other substances where the pieces or particles
 “of the substance are of various sizes and magnitudes.”

In the vessel that contains the filtering materials, the several
 classes of the sand, &c. must be regularly and evenly laid in
 strata, beginning with the particles of the largest size proper
 to be used, and proceeding in regular order, in a “subduple”
 ratio, to the smallest size, until all the strata are regularly
 placed.

“The filters will be cleansed by drawing out the head or
 “body of water or fluid, by which the water or fluid will
 “descend in the filter, and carry with it all foul and ex-
 “traneous substances.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 81, p. 221; and
 Rolls Chapel Reports, 6th Report, p. 185.]

A.D. 1792, November 28.—No. 1920.

COWEN, GEORGE.—“Improvement on an invention of a cis-
 “tern or reservoir for filtering, cleansing, and purifying foul

“ and offensive water, and rendering it fine and clear, by the
“ most simple and evident means, and which were never here-
“ tofore put in practice.”

The placing “a quantity of sand, or any other filtering ma-
“ terials” in a box or cistern, in such a manner that the water
must pass through the filtering medium, constitutes this
invention.

The cistern is divided into two compartments. The foul
water which is let into one of the compartments, is obliged to
pass down through the filtering materials in one compartment,
and to rise through the filtering materials in the other com-
partment in a filtered state.

When the filtering materials become saturated with the
sediment of the foul water, they are to be cleansed by stirring,
when there is a quantity of water in the cistern, and letting it
(the water) run off.

[Printed, 4d. No Drawings.]

A.D. 1797, October 31.—No. 2196.

BRAMAH, JOSEPH.—“Methods of retaining, clarifying, pre-
“ serving, and drawing-off all kinds of liquors commonly used
“ for the beverage of mankind, more especially those liquors
“ called malt liquors, such as porter, ale, beer, &c., together
“ with sundry improved casks and implements necessary to
“ give contrivance the full effect.”

One of the instruments for effecting the foregoing objects is
a filtering machine. This may be made of copper, tinned on
the inside or of other suitable materials. An urged or forced
filtration is employed for the purpose of procuring clear
water, the outlet being at a higher level than the inlet, and the
floor carrying the filtering materials being between the inlet
and the outlet pipes. The filtering materials may be porous
stone, wood, leather, paper, flannel, sponge, sand in bags, or
similar materials. When the lower and conical part of the box
has collected a quantity of dregs it must be withdrawn at a
cock on a pipe at the bottom of the vessel. The drawings
represent a cylindrical vessel with a conical bottom; the cylin-
drical portion carries the entrance and exit pipes, and has a
flat plate or cover bolted to its top.

[Printed, 1s. 2d. Drawing. See Repertory of Arts, vol. 9, p. 361.]

A.D. 1802, March 24.—No. 2598.

GRANT, HENRY.—A “machine for the purifying and clarifying of water, whereby the most putrid or foul water may be rendered perfectly sweet and clear.”

[No Specification enrolled.]

A.D. 1802, May 31.—No. 2626.

WILSON, JOHN.—“A method or methods of purifying, clarifying, reducing, separating and decomposing fluids.”

This invention is separable into three parts, namely:—1st. The clarification of fluids. 2nd. The purification of fluids. 3rd. The reduction, separation, and decomposition of fluids.

References are made by the patentee to several discoveries and to the prior use of different processes for the above-mentioned purposes; but a distinction is drawn in every case between those processes and the methods comprehended in this invention.

The clarification of fluids consists in the filtering of liquids by means of sand or other insoluble powders that are compressed into the vessel, the points of entrance into the filtering vessel, and exit therefrom being guarded by guards or strainers. The strainer that is preferred is formed of a flat cylindrical box with perforated ends and containing compressed sponge.

The purification of fluids is accomplished by means of charcoal from which the unpalpable powder of charcoal is removed by sifting. This charcoal is used in connection with the above-mentioned guards. Oak charcoal, ground in a mill, has been found to answer well.

Although the word fluid is much used in this Specification, water is the principal fluid that is subjected to filtration.

The drawings show instances of filtration by descension, by ascension, and by providing a circuitous route for the fluid to traverse. A mud chamber is mostly provided. In two instances the filter consists of a syphon filled with the filtering materials; in one case the syphon is open at the top and acts entirely by capillary attraction.

Although in general, the principle of separation and decomposition of fluids, as put forward in the third part of this invention, does not come within the scope of the present series of Abridgments, its application to sea water is accomplished

in conjunction with a charcoal filter and fairly has place here. "This process or principle of decomposition is the putrid fermentation" which "when pushed sufficiently far, will completely destroy and remove the saline matters dissolved in the waters of the sea, and leave it in such a state as to be rendered perfectly pure, fresh, and sweet by passing it through a purifying filtre of charcoal." In the hold of a ship at sea, the situation most favourable to "putrid fermentation," the water filters "under considerable pressure through the sides of the vessel, carrying with it the fine particles of the substances through which it passes," "and is all the time agitated and exposed in thin layers to the influence of the air in the vessel, and to the airs and gases which are continually extricating."

[Printed, 1s. Drawing.]

A.D. 1805, July 19.—No. 2867.

WITHERBY, HENRY EDWARD.—"A new apparatus for purifying and improving water and other liquors by filtration."

Two parts, a fountain and a filterer, compose this apparatus. These are put into communication by means of a syphon. What constitutes the invention is "the peculiar combination of these two parts."

The drawings show this apparatus of various modifications and sizes. The "fountain," in one instance, is a vessel of tin or earthenware, perfectly closed with the exception of a tube projecting downwards from its bottom, the vessel being supported upon legs. The fountain is filled by means of the tube, and is reversed for that purpose. When upright, the fountain supplies, with regularity, a cylindrical vessel lower than the fountain and connected with the filterer or receptacle of sand, pebbles, or hair cloth, by means of a syphon of sponge or flannel cut in proper lengths. The water is drawn off from the bottom of the filterer by means of a pipe.

In another apparatus, the alternate operations of filling and filtering are accomplished by an arrangement of cocks and an air pipe.

An apparatus slung upon chains is also shown; this is applicable for use on board ship.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 2 (second series), p. 165.]

A.D. 1806, July 25.—No. 2952.

LAMB, JOHN.—“Improvements in and upon a machine for
“ extracting fresh water from the salt water of the ocean
“ (by distillation), and other purposes, at sea and elsewhere.”

The principal points that relate to distilling in this apparatus
are :—

The distilling arrangements are a part of a caboose for the
purpose of cooking at sea.

Dampers are freely used to confine the heat and to direct it
to the part of the machine which is being used. “All the
“ boilers are to be placed in the back part of the hearth or
“ caboose, and by drawing out a horizontal damper to be
“ made in the back side of the hearth or caboose, and to draw
“ out from between the cooking boilers and the distilling
“ boiler, will admit the fire to draw under the distilling
“ boiler.”

A movable cover is fitted on the top of the distilling boiler,
by which the sea water is introduced. By the side of this
cover is a still head, into which the steam rises and passes
along a tube into the worm of a condensing vessel, which
vessel is filled with cold sea water. The fresh water flows out
of the worm into a reservoir.

On the top of one or more of the cooking boilers is also fitted
a distilling apparatus.

In the top of the refrigerating vessel is to be a hole to admit
a kettle for cooking by steam. The steam is let into the kettle
by a pipe leading from the pipe fitted to the cooking boiler,
and the steam passes out of the kettle into a pipe that leads
into the worm of the refrigerating vessel. A hand pump,
fitted to the said vessel, draws off the water when it becomes
hot, “so as to admit cold sea-water for condensing the
“ evaporation as before mentioned.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 11 (*second series*),
p. 407.]

A.D. 1809, April 18.—No. 3225.

ARCHBOLD, JOHN FREDERICK.—“A method of converting
“ salt or sea water into fresh water, both on land and on
“ board of ship at sea.”

This invention "is for producing pure fresh water from salt or sea water by distillation on a new principle and by filtration."

The method of distillation is by enclosing the still in a steam jacket, and thus exposing its exterior to a heat much beyond that of boiling water. The steam jacket has a safety valve and may have a horizontal flue. On board ship a reservoir of salt water on the deck of the vessel supplies the still or stills with water by means of pipes, the pipes being suitably fitted with cocks.

"For the purpose of condensing on board of ship, the tube containing the steam to be condensed may pass through the ship, and along any part of the outside of it which lies immediately in the water, and again entering the ship it discharges the condensed matter into any vessel which may be designed for its reception."

After the sea water has been distilled "it is passed through a filterer, of which the following is a description :—A small cylindrical case is made of tin or other metal, and being filled with pounded charcoal, each end is stopped by a circular cover, perforated with holes fine enough to prevent the charcoal from passing through; one end of this case is inserted into a cask, also partly filled with pounded charcoal, and the water being poured into the cask filters out through the case."

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 16 (*second series*), p. 282.]

A.D. 1810, February 27.—No. 3312.

STEPHENSON, JOSEPH. — A "machine for filtering and purifying water."

This filter consists of an arrangement of parts whereby water poured into the "descending branch descends through compressed sponge through a stratum of charcoal, and then through another stratum of sand, when it reaches the bottom of the compartment, under the descending branch, whence it passes through the opening at the bottom of the middle division into the other compartment, and then ascends through a stratum of sand, through a stratum of charcoal, and through another stratum of sand, and rises into the ascending branch, which serves as a reservoir for the filtered

“ water. In the last-mentioned compartment a cock or pipe as may be required, is inserted above the upper face of the upper stratum of sand for the purpose of drawing off the filtered water as it may be wanted for use.”

In one of the forms of this apparatus, the body consists of a chest with a vertical and central partition. In the cover, there is a hole over each compartment; into one hole is inserted the smaller end of a conical vessel, and over the other hole is placed a conical vessel with its base downwards. Each conical vessel communicates with the interior of the chest by means of its open bottom. The inverted cone is called the descending branch, the upright cone the ascending branch. The descending branch has sponge compressed into its small end, and the ascending branch carries a cock or pipe to draw off the filtered water.

In another form, sponge compressed between gratings is employed.

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 17 (*second series*), p. 65.]

A.D. 1811, August 7.—No. 3472.

ASHLEY, JOHN.—“ An improved filtering vessel for purifying and cleaning water.”

The vessel may be made of any “ material that is sweet and water-tight. The filtrating medium consists of well-cleansed sand from the sea, Thames drift, or quarry, and fine gravel, the quantity about half the contents of the vessel. An inch from the bottom of the vessel is fixed a perforated plate, having a pipe in the centre extending upwards to the cistern.” “ On the plate is put a layer of fine gravel about two inches thick, but not so fine as to pass the holes in the plate; on the gravel is laid a stratum of the sand, about eight inches thick, and then a layer of fine gravel about two inches thick; which filtrating medium is closely pressed down with the perforated plate like the other, and the plate made fast to the side of the vessel; four inches above this plate is secured water-tight, to the inside of the vessel a sound plate,” “ which makes the upper part of the vessel a cistern to hold the water to be filtered, wherein if the fetidness of the water require it, may be immersed bruised charcoal in canvass bags.” “ At

“ the upper end of the pipe, which is fixed in the centre of
“ the lower plate, is a perforated screw socket, to receive a
“ hollow screw fixed to the end of a small pipe, which, when
“ in the socket, gives air to the space at the bottom of the
“ vessel. The water from the cistern passes through the
“ perforated screw to the bottom space, and ascends through
“ the filtrating medium, whereby it is purified and made clear,
“ and remains in the space above it to be drawn off by the
“ cock when wanted ; by raising or lowering the screw pipe in
“ the socket the water is filtered quick or slow. In the bottom
“ of the cistern is placed the washer and plug or valve, by
“ opening of which and filling the cistern with water the
“ filtering medium is cleansed downwards and the foul water
“ drawn off by the lower cock. By taking out the screw pipe
“ the water in the cistern also washes the sediment that
“ settles at the bottom of the vessel through the cock ; a
“ small pipe is fixed in the cistern to give air to that part of
“ the vessel that contains the clear water.”

[Printed, 6d. Drawing. See Rolls Chapel Reports, 8th Report, p. 85.]

A.D. 1812, February 8.—No. 3538.

DICKINSON, ROBERT, and MAUDSLAY, HENRY.—“ A process for sweetning water and other liquids, and applicable to other purposes.”

“ Our process consists simply in forcing a stream or streams
“ of air through the foul or tainted water intended to be
“ rendered sweet.” “ The means which we have found best
“ for this purpose are either bellows or a pump. If bellows
“ be employed, a tube or hose made of leather or any similar
“ contrivance will be found a convenient appendage fastened
“ to the nozzle of the bellows for conveying the air into the
“ water casks, and it will be found convenient to attach to the
“ end intended to discharge the air a piece of tube made of
“ iron or copper and perforated with small holes, to divide the
“ air into numerous small streams, that the surface of water
“ brought into contact with the air may be the greater. If a
“ pump be employed, which we prefer, it should be furnished
“ with a similar hose or pipe, and the valves may be so dis-
“ posed that the pump on being worked may at each stroke
“ take in a charge of air, and force it to pass through the

“ water intended to be purified. In either case, the tube that
 “ discharges the air into the water should pass into it deep
 “ enough to reach the bottom of the cask.” “The pump
 “ intended for this process may” “be rendered applicable to
 “ other useful purposes on board ship, as for watering a ship
 “ from alongside, and conveying the water, when required,
 “ from the hold to the deck; and by means of an air vessel
 “ and discharging pipe judiciously attached to the pump, it
 “ may be employed as an engine for wetting the sails or
 “ extinguishing fire; and, in addition to all these uses, the
 “ same pump may be easily adapted to the purpose of venti-
 “ lation, by drawing foul air from the hold and replacing it
 “ with fresh air.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 22 (second series),
 p. 129; and Rolls Chapel Reports, 8th Report, p. 89.]

A.D. 1818, January 15.—No. 4201.

FRASER, JAMES.—“ A cooking machine for the more simple
 “ and effectual decomposition of salt water, and render the
 “ said salt water more useful to the general purposes of a
 “ ship’s crew at sea, without any extra apparatus except the
 “ said cooking machine; or in other words, its structure will
 “ answer the end of a worm or condenser and worm tub, &c.
 “ &c.”

This invention consists in the combination of a cooking
 apparatus with such additional parts as will enable sea water
 to be distilled; “also in making a flue or flues to pass through
 “ the water of the boiler, for the joint purpose of heating the
 “ water in the boiler and the oven above it at the same time;
 “ and, lastly, in applying a breakwater and current of air to
 “ act upon the distilled water when in a divided state.”

“The sea water is boiled and converted into steam in a
 “ boiler or vessel so constructed as to be heated by the
 “ surplus heat of an open fire, at which roasting or the ordi-
 “ nary operations of cooking can and may be” “performed
 “ in addition to the cooking which may at the same time be
 “ going on in the vessels which are heated by the steam of
 “ the sea water issuing from the boiler, to which other extra
 “ fires are applied for quickening the process; or, when
 “ cooking in these vessels is not required, they may be filled

“ with cold sea water, which will condense the said steam, and
“ convert it into fresh water.”

The drawings show a boiler containing sea water, with a head to contain steam and pipes proceeding thence to a jacket surrounding the cooking apparatus, beneath which the steam from the sea water is condensed, and may be drawn off into a tank containing a breakwater or mass of stone for the water to dash upon so that it is dispersed into drops and thereby aerated, a current of air proceeding through the tank, between the boiler and the cooking apparatus to the chimney, for that purpose.

[Printed, 1s. 8d. Drawings. See Rolls Chapel Reports, 8th Report, p. 122.]

A.D. 1818, March 7.—No. 4233.

SUTHERLAND, JOHN.—“ Various improvements in the construction of an apparatus for the purifying of liquids.”

The filtering medium is cloth, stretched on a “leaf” or frame, and the invention consists in the method of placing the leaves in ground sockets, and of carrying off the purified liquor therefrom by means of separate pipes and stop-cocks, so that each leaf becomes a distinct filter, and may be worked singly or altogether, and any accident occasioning foul runnings from one will in no way impede the action of the rest, as the operation of the foul leaf may be put an end to by shutting its stop-cock.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 35 (*second series*), p. 204; and Rolls Chapel Reports, 8th Report, p. 120.]

A.D. 1818, August 31.—No. 4289.

BENNET, JOHN.—“ Improvements on filtering vessels, and in
“ the filtering medium thereof.”

The improvements in filters relate to those in which perforated plates are used, and chiefly concern the arrangement of the internal parts of the filters. The filtering medium is “a
“ layer of purified charcoal of bones grossly pounded or in
“ small pieces or lumps about one inch thick, next after the
“ common layer of gravel, about an inch thick; then, after
“ adding a common layer of sand three inches thick, then a
“ layer of very fine ground purified charcoal of bones about
“ half an inch thick, and then a layer of very fine ground

"charcoal of Prussian blue, made by potash, about half an inch thick; after these, a common layer of sand about six inches thick, and then a common layer of gravel about one inch thick, are added."

The supply cistern rests on a leaden ring that is supported at the top of the filter by six "notches." The supply pipe descends to the bottom of the filtering vessel at the side of the internal part of the vessel. More than half way from the bottom of the filtering vessel is a horizontal perforated plate, and the filtering medium is included between this plate and another perforated plate at a short distance from the bottom of the filter; four "notches" support the latter plate. At the head of the supply pipe is a boss and a rim. A boss at the bottom of the filter receives a cock to discharge the dirt. To draw off the filtered water, which has ascended through the filtering medium, another boss receives the exit cock. The air pipes are placed on the side of the filtering vessel. The head of the supply pipe is divided into four parts. A sponge is placed under a perforated lead or iron weight, immediately over the head of supply pipe.

[Printed, 6d. Drawing. See Rolls Chapel Reports, 8th Report, p. 152.]

A.D. 1819, August 11.—No. 4393.

TRITTON, HENRY.—"An improved apparatus for filtration."

This invention consists in "the combination in one apparatus of an air pump or other known machine for producing a rarefaction or exhaustion of air connected with such part or parts of the apparatus as is destined to receive the filtered liquid, a filtre or filtres proper for the filtration of liquids, and a filterer in which the surface of the unfiltered liquid is directly or indirectly exposed to the pressure of the external air. I claim, moreover, as of my invention, when a vessel for the reception of the filtered liquid is used in connection with the filterer, the combination of vessels and machinery for the above purpose, in such a manner as that the filtered liquid may be drawn out of the receiver at pleasure without obstructing the process of filtration in the filterer."

A square filterer is shown, in connection with a receiver that may be made air-tight. When the filterer is kept supplied with liquid and the air pump applied to the receiver, the said

liquid passes through filtering boxes into the receiver. When the receiver is to be emptied, the pipe communicating with the filterer is closed by a cock, an air cock is opened, and the filtered water is allowed to flow out by opening the exit cock.

[Printed 6d. Drawing. See Repertory of Arts, vol. 42 (second series), p. 286; and London Journal (*Newton's*), vol. 1 p. 84.]

A.D. 1822, September 27.—No. 4706.

MOXON, JOHN DOWELL, and FRASER, JAMES.—“Improve-
ments in ships’ cabooses or hearths, and also for apparatus
to be occasionally connected therewith for the purpose of
evaporating and condensing water.”

This caboose consists of a fire place, boilers, oven, and chimney in one apparatus. When it is required to condense the steam from the sea water employed in the boilers a condenser is added. The boilers are placed immediately over the fire, they are nearly rectangular in shape, and the vessels or internal cases to contain the articles to be boiled are placed in the sea water which the boilers contain. The tops of the boilers are closed by loose lids or covers which are adapted to enter into gutters or channels that surround the mouths or upper parts of the boilers; the steam is conducted off by a pipe or pipes to a condensing apparatus. The covers may be lifted off, and the internal cases withdrawn, so as to obtain ready access to the boilers, and thus prevent the accumulation of salt in them.

The condensers consist of metal boxes or chambers placed one over the other. Three are shown in the drawings. Through these chambers is a vertical air trunk to assist in the condensation. The steam passes from the boiler into the upper chamber, and is partially condensed therein, thence, through a small pipe, into the middle chamber, and finally, into the lower chamber, which is constantly kept surrounded by cold sea water. The condensed water may be withdrawn from the lower chamber by means of a cock.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 45 (second series) p. 268; and London Journal (*Newton's*), vol. 7, p. 248.]

A.D. 1824, August 11.—No. 5000.

SCHRODER, HERMAN.—“A new filter.”

“The nature of my said invention doth consist in clarifying
liquors of various kinds by passing or filtering the same

" through one or more wide bags compressed with longitudinal folds into a narrow or small circumference by means of a narrow or small pipe, casing, or sheath, drawn over the said wide bag or bags."

Preferably, the bag is made of twilled calico and the casing of sacking. To introduce the liquor into the bag, a conical funnel is introduced into the mouth of the bag. The funnel has its upper end fitted with a screw to secure it to the bottom of an elevated reservoir; its lower and wider end is fitted with a flange to prevent a loose ring from slipping off. Having placed the funnel in the mouth of the bag and case, the ring is pushed down over them both, and the ends of the bag and case are turned over. The case is, preferably, made conical, the lower end being the smaller and open to allow the filtered fluid to pass off to any suitable receptacle.

[Printed, &c. Drawing. See Repertory of Arts, vol. 1 (third series), p. 467; and London Journal (Newton's), vol. 10, p. 361.]

A.D. 1824, December 4.—No. 5048.

SUWERKROP, JOHN HILLARY.—(*A communication.*)—"An apparatus or machine which I denominate a 'thermophore,' or a portable mineral or river water bath and linen warmer, and also " "other apparatus or machines connected therewith for filtering and heating water."

" The apparatus or machine for filtering water consists either of one or more vessels, or of a vessel with a partition in the middle of it, dividing it into an upper and a lower vessel. Two false bottoms, perforated all over with holes, are placed in this vessel. "Underneath these holes a spiral coil of twisted and plaited horse-hair cord is placed, and secured by means of nails driven through it with pieces of thick leather placed under their heads." "Upon each of the false bottoms a layer of coarse well-washed gravel, flints, &c. is put, and over that a layer of finer gravel, &c., and which is succeeded by layers of others still finer and finer until it reaches near the upper part, when it is covered with a layer of sand six or more inches in thickness, the whole thickness of the different layers being about two and a half feet." "The water enters from a reservoir placed above the level of the vessel, through the pipe into the lowest part of the vessel. "It then ascends, passing through the horsehair coil, the

“ gravel and sand, and passing through the curved pipe into
 “ the lower part of the upper vessel. It is then again filtered
 “ by ascending through a second series of filtering materials
 “ similar to the former, and finally passes off above by the
 “ pipe.”

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 11, p. 304;
 Register of Arts and Sciences, vol. 3, p. 305; and Engineers' and Mechanics'
 Encyclopædia, vol. 1, p. 501.]

A.D. 1825, March 5.—No. 5114.

CHAMBERS, ABRAHAM HENRY, CHAMBERS, ENNIS, and
 JEARRARD, CHARLES.—“ A new filtering apparatus.”

This invention consists in “causing water, when it is to be
 “ filtered, to pass upward through a filtering bed, or the
 “ materials which are to filter it, instead of downwards, as is
 “ usually the case, and for causing such passage upwards
 “ of the water to be effected by its own specific gravity and its
 “ natural inclination to regain that level from which a part
 “ of the said apparatus for a time diverts it.”

The drawings show three methods of applying this invention.

In the first instance a rectangular cistern is shown divided into two compartments by a vertical partition. To one of these compartments the foul water is admitted by means of a ball-cock; it then proceeds down a small vertical pipe leading from the bottom of the compartment to a chamber from which a large pipe leads upwards to the other compartment. The large pipe is filled with filtering materials. Pozzolane is the filtering material preferred. The filtered water is drawn off from the second compartment by means of a cock. The dirt deposits itself in the chamber, from which it may be withdrawn by a cock or door.

In another case, a vertical cylinder on a frame in a water-butt receives the foul water and contains the pozzolane. The foul water is received through a bottom perforated plate and the filtered water is stored in the upper part of the cylinder.

In filtering the water of a river in its course, the stream is interrupted by a dam and turned down a shaft under arches that carry gratings on which pozzolane is placed. The bed of the river on the opposite side of the dam contains filtered water.

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 3 (third series), p. 376;
 and London Journal (*Newton's*) vol. 11, p. 245.]

A.D. 1826, April 27.—No. 5352.

WILLIAMS, JOHN.—“Improvements in ships’ hearths, and
“apparatus for cooking by steam.”

This hearth consists of a grate, an oven or roaster at the back of the grate, a boiler above, and a chimney. The chief features in the invention are, the introduction of an air channel between the back of the grate and the oven, “the dividing
“the heat and flame from the fire, and causing it to heat
“either the oven or boiler at pleasure,” also the introduction of two falling bars in the grate.

The boiler is “formed of strong wrought-iron plates firmly
“riveted together, and strengthened by angular bars around
“it;” it is divided into two separate parts by a plate also rivetted to its bottom and sides, and it is furnished with a band or division frame into which is fitted the vessels to be heated by the steam from the boiler.

“The steam from the boiler may be condensed and collected,
“if thought necessary, by causing it to pass through a worm
“in a worm tub, furnished with water in the usual manner
“of distillation;” or it may be conveyed into the chimney by a small flue furnished with a damper. The drawings show the worm and worm tub connected to the boiler.

[Printed, 10*d*. Drawing. See London Journal (*Newton’s*), vol. 14, p. 359.]

A.D. 1826, August 4.—No. 5401.

WILLIAMS, JOHN, and DOYLE, JOHN.—“An apparatus
“and process for separating salt from sea water, and thereby
“rendering it fresh and fit for use, which invention may be
“applied to other useful purposes.”

The apparatus shown in the drawings consist of a barrel that has a descending pipe from its bottom to a leaden cistern which is completely filled with filtering material. The water to be filtered passes down the descending pipe and up through the filter to an exit pipe near the top of the said filter.

At the bottom of the cistern is placed a stool, supported on five legs and covered with a perforated plate of copper. A layer of wool lays on this plate, and it filters the coarser impurities of the water; above the wool, and extending to the top of the cistern, sand is placed. A cover, pressed down by a

screw, keeps the sand in position. "The sea water in passing up through the sand or other substance deposits its salt, and comes out fresh" through the exit pipe.

When the filtering materials are "completely saturated with salt and impurities," a cock at the bottom of the cistern being turned allows all the water that may be in the descending pipe to run out. The cover is then taken off, the filtering materials taken out, the wool washed and replaced, the cisterns refilled with fresh sand, the cover fastened down and the barrel filled with salt water; the apparatus is then fit for use.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 5 (*third series*), p. 381; London Journal (*Newton's*), vol. 1 (*second series*), p. 158; and Register of Arts and Sciences, vol. 4, p. 401.]

A.D. 1827, November 8.—No. 5559.

WHITE, JAMES.—"A machine or apparatus for filtering, which I denominate 'an artificial spring.'"

According to this invention, a slab of stone is placed near to the bottom of a vessel. Underneath this slab the water enters through a pipe passing from a cistern placed above the vessel. The pressure forces the water through the stone. It is drawn off through a tap in the upper part of the vessel.

To keep the stone clean, back filtration is accomplished by means of cocks, and the sediment may be run off by a waste pipe.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 11; London Journal (*Newton's*), vol. 4 (*second series*), pp. 323; Mechanics Magazine, vol. 8, p. 369; and Register of Arts and Sciences, vol. 2 (*new series*), p. 204.]

A.D. 1828, March 26.—No. 5632.

DE FONVILLE, FERDINAND.—"Improvements on filtering apparatus which I intend to denominate the Royal filtering apparatus."

The object of this invention is to introduce filtering media into ordinary house cisterns. The cisterns are fitted with several shelves on which are placed river flints, coarse sand, fine sand, and bruised charcoal. Earthenware strainers are inserted in the upper shelf to direct the course of the water through the filtering materials, and pieces of sponge are inserted in these strainers. There is a pipe, "open to the air at top and communicating with the lower part of the cistern"

containing the filtered water "by means of which the water is kept sweet."

[Printed, *6d.* Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 290; and London Journal (*Newton's*), vol. 4 (*second series*), p. 206.]

A.D. 1828, August 16.—No. 5685.

STIRLING, THOMAS.—"Improvements on filtering apparatus
" or machines."

This apparatus contains a series of plates or shelves made by preference of slate. Each plate is partially perforated in such a manner that none of the perforations in one plate is immediately over that in another. "By this arrangement of the holes in the plates I compel the water to be filtered to make a circuitous course or passage nearly horizontally through the filtering materials, instead of passing vertically through them, as it otherwise would do, and thereby I am enabled to effect its purification in a more complete and effectual manner." The water is introduced at the bottom, passes upwards through these plates, and is drawn off in a filtered state at the upper part of the apparatus. A layer of "Carron river sand" is placed on some of these plates, and a layer of dander or the scoriae, obtained from the Carron ironworks in Scotland," on others.

[Printed, *6d.* Drawing. See Repertory of Arts, vol. 9 (*third series*), p. 143; London Journal (*Newton's*), vol. 3 (*second series*), p. 50; and Mechanics Magazine, vol. 12, p. 49.]

A.D. 1828, September 4.—No. 5697.

BELL, WILLIAM.—"Improved methods for filtrating water and
" various other liquids."

One form of the improved filter consists of a vessel containing five plates, placed at certain spaces one above the other, and some of these plates being perforated. The filtering medium, composed of pounded coke or cinders and sand, is placed between pairs of these plates and upon pieces of fine haircloth. Three taps, communicating with spaces between the plates, are affixed to the outside of the vessel. The water to be filtered is introduced at the bottom, and ascends through the filtering media. Tubes are introduced to carry off the air which accumulates in the spaces between the plates. "A principle peculiar to its construction is, that it filters downwards in as

“ perfect a manner as upwards, by inverting the construction
 “ and stratification of the mediums, only in that case the
 “ stopper” in the upper and solid plate “is kept fixed.”
 Another form consists of an “egg-like form or figure,” composed of stone or other porous material, and which filters water when forced through it under pressure.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 736; London Journal (*Newton's*), vol. 7 (*second series*), p. 88; and Register of Arts and Sciences, vol. 3 (*new series*), p. 347.]

A.D. 1881, May 24.—No. 6117.

WESTRUP, THOMAS, and GIBBINS, WILLIAM.—“Improve-
 “ ments in converting salt or other water into pure or fresh
 “ water.”

The object of this invention is “to construct the apparatus
 “ used in condensing the steam arising from sea or other
 “ impure water in such manner that the condensation shall
 “ at all times be going on without attention from any person.”

The said invention “consists in placing the condenser below
 “ the water line in ships or vessels, and permitting the water
 “ in which such vessels float to have free and full action on
 “ the outer surfaces of the pipes or other apparatus used
 “ for condensing the steam arising from sea or other impure
 “ water.”

The drawings show a boiler for cooking purposes heated by a separate fire place, the flue of which passes round the boiler and thence into the chimney of the principal grate. The boiler of the distilling arrangement surrounds the above-mentioned boiler. Another boiler is placed at the back of the fire in the principal grate. On the top of the two latter boilers there is a steam pipe which passes through the deck or decks and leads to a condenser, placed below the water line. The condenser is a cylindrical vessel, containing a coiled pipe into which the steam passes. An upper and a lower pipe from the sea are respectively connected to the condenser so as to form an entrance and exit for the sea water.

In another arrangement of condenser, a pipe or pipes, in continuation of the steam pipe, is fixed on the outside of the bow of the vessel and passes down, outside the vessel, to the ship's bottom, where it enters the ship through the planking.

The condensed water runs from the said pipe or pipes into a cask placed below.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 13 (*third series*), p. 19; and vol. 5 (*new series*), pp. 227 and 241; London Journal (*Newton's*), vol. 7 (*conjoined series*), p. 82; Mechanics' Magazine, vol. 24, p. 488; Register of Arts and Sciences, vol. 6 (*new series*), p. 301; Webster's Reports, vol. 1, p. 554; Webster's Patent Law, pp. 19, 53, and 82; also p. 136, case 120, and p. 140, case 150; and Carpmael's Reports on Patent Cases, vol. 2, p. 219.]

A.D. 1831, September 9.—No. 6160.

NEVILLE, JAMES.—“An improved apparatus for clarifying “ water and other fluids.”

On the bottom of a vessel made of any suitable material is placed, mouth downwards, a pan of a conical or dished form, and made of porous or unglazed earthenware. “The rim or “ mouth of this pan has a number of notches or apertures to “ admit of the free passage of the purified water; and I cement “ or tie a strong slip of felt round the mouth or lower rim of “ the said pan in order to prevent any minute particles of the “ filtering or clarifying medium from passing or entering into “ the said pan,” at the top of which is a pipe for drawing off the filtered water. The pan is surrounded with a layer of coarse siliceous grit or sand, to the height of two or three inches, and a bed of vegetable charcoal is placed on the top of this layer. A piece of thick woollen felt is then placed above the charcoal, and a slate above the felt, space being left between the edges of the slate and the sides of the vessel for the passage of water over the surface of the felt.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 1 (*new series*), p. 347; London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 146; and Register of Arts and Sciences, vol. 7 (*new series*), p. 79.]

A.D. 1831, September 20.—No. 6164.

COSNAHAN, MARK.—“Improvements in apparatus, modes, “ or processes of converting sea or salt water (and also other “ brackish, turbid, or impure waters) into purified or fresh “ water, which apparatus, modes or processes, or parts thereof, “ may be applied to other purposes.”

This invention consists in combining and arranging various parts “whereby the steam is first passed into a condenser, and “ when condensed it is passed into the clarifier, and again “ boiled, whereby it is deprived of its impurities, and at the

“ same time the impure water which is used to condense the steam becoming heated supplies the boiler with water considerably heated, and thus produces a great saving in fuel.”

The improvements also consist in an arrangement for distilling spirits, in which second and third distilling apparatus are employed. There is a space between the bottoms of the second and third stills respectively, and the flue, by which there is at all times a quantity of wort between the flue and the said stills “ which prevents the spirits becoming burned.”

The drawings show a rectangular boiler with the grate running through it. Three forms of cooling apparatus are shown. In one, a series of tubes branch from a hollow collar on the main tube and form a cage-like arrangement, the tubes being parallel and their lower ends being collected to another collar or hollow vessel connected to the exit pipe. The said series of tubes are placed in the condensing vessel that contains cold water. In another arrangement, two concentric tubes have a thin steam space between them; a third plan similar to the last, has no bottom.

In some instances the cooling water flows into the boiler direct, and, in others, it passes into a feeder and thence into the boiler.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 13 (*third series*), p. 271; London Journal (*Newton's*), vol. 7 (*conjoined series*), p. 159; and Register of Arts and Sciences, vol. 7 (*new series*), p. 98.]

A.D. 1834, November 6.—No. 6708.

BAGSHAW, SAMUEL.—“ An improved filter for water or other liquids.”

“ I take five parts, by measure, of pulverized charcoal, and
 “ and five such parts of pulverized stone, and two such parts
 “ of potters' clay. I combine these substances with water into
 “ a fit state for moulding. I form with this composition the
 “ figure of a ring, of which the side is about one third of an
 “ inch thick, the depth about three inches, and the diameter
 “ is made suitable to the vessel into which it is to be placed.
 “ I then form flat pieces of about an eighth or three-sixteenths
 “ of an inch thick, and of the same depth as that of the afore-
 “ said ring, and of such different lengths as will fit across the
 “ aforesaid ring.” “ I place one of these pieces upon another

“ of the same length, inserting between them pasteboard or
 “ other substance, so as to prevent them from uniting except at
 “ those three edges which will form their tops and sides when
 “ they are fixed across the said ring. I then unite the two
 “ pieces together along the aforesaid three edges ; I afterwards
 “ withdraw the substance which I had inserted, and thus leave
 “ a space between the interior sides and between the bottoms
 “ of the said united pieces. I place these double pieces
 “ across the aforesaid ring at the distance of about half an
 “ inch from each other and unite them with the ring ; I then
 “ form a bottom between each of the said double pieces, and I
 “ perforate these bottoms with small holes ; I afterwards bake
 “ this apparatus ; it has hitherto been baked in a pipe maker’s
 “ oven. I afterwards place my said apparatus into such a
 “ vessel as is used for a filtering machine at about an inch
 “ from the bottom of it ” “ and I fasten the upper edge of my
 “ said apparatus to the side of the vessel by forcing between
 “ them cloth or other material, and covering such material
 “ with cement.”

[Printed, *ad.* No Drawings. See London Journal (*Newton's*), vol. 14 (*continued series*), p. 172.]

A.D. 1834, December 23.—No. 6736.

STOTHERT, HENRY.—“Improvements in ships' hearths or
 “ cabouses.”

This apparatus has a fire-place, ash pit, flue, chimney, boiler, diaphragm, separator, cooking or boiling vessels, safety valve, syphon, pipe leading from the syphon to the condenser, gauge cocks and ocular or glass gauge, discharge cocks, supply cock, manholes, refrigerator or cistern, condenser, distilled water pipe, feed pipe, waste pipe and ovens.

This invention consists in collecting fresh water from steam for the purpose of cooking, the said steam being produced from salt water ; and in the means of condensing the steam. A division plate or diaphragm is fixed between the space occupied by the water and the part that contains the cooking vessels, in order to prevent the steam condensed into water in cooking from returning and mixing with the salt water in the lower part of the boiler, “ and by attaching to the upper side “ of this diaphragm a hollow chamber,” called the separator, which is sufficiently narrow to stand up between the cooking

vessels. The separator prevents the salt water in the lower part of the boiler from passing over with the steam into the part of the boiler above the diaphragm when the water in the lower part of the boiler is agitated. A pipe proceeds from the bottom of the upper part of the boiler to the refrigerator; upon this pipe is an inverted syphon. The refrigerator is divided horizontally by a plate, into an upper part or cistern, and a lower part or condenser. When the water in the cistern becomes warm (by absorbing the heat of the steam, through the said plate, during condensation), it is filled with cold water by a feed pipe, the exit of which is near the bottom of the cistern. The warm water passes into the boiler by displacement, or it may be run to waste.

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 54.]

A.D. 1836, February 23.—No. 7011.

PEYRE, FRANÇOIS, junior. — (*A communication.*)—"Improvements in the means of economizing fuel in ships' hearths or cooking apparatus, and of obtaining distilled water from sea water, which improvements apply to generating steam."

The principal novelty in this invention consists in injecting heated air into the salt water contained in the boiler, from time to time, by means of a blower, pump, or other apparatus. This increases the ebullition and evaporation of the water.

Another improvement consists in mixing with the sea water in the boiler, alum and sulphuric acid to prevent the incrustation of saline particles on the interior of the boiler.

In a third improvement, after the distilled water has been discharged from the apparatus and mixed with a very small portion of sulphuric acid and charcoal, cold air is blown into the distilled water and renders its taste like that of spring water.

The drawings show an apparatus to carry out the above-mentioned improvements in combination with a cooking apparatus. After heating the cooking vessels the steam passes to a worm head in the condenser, through the worm to the exit cock. The air blast from cylindrical bellows passes into the hollow fire bars of the furnace and through a pipe to the

bottom of the interior of the boiler where it issues from a number of small jets and bubbles up through the sea water. A reservoir for supplying the condenser with cold water is shown. The cold water enters the lower part of the condenser, and is drawn off at the upper part as warm water.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 6 (*new series*), p. 343; London Journal (*Newton's*), vol. 9, (*conjoined series*), p. 5; and Rolls Chapel Reports, 7th Report, p. 171.]

A.D. 1836, May 28.—No. 7103.

GEROTHWOHL, JOSEPH MENCKE.—(*A communication.*)—"Improvements in filtration."

"These improvements are, firstly, "the introducing the unfiltered water into the filtering machine by a water-tight pipe or hose communicating with and fitted into the cistern or reservoir containing the same, so that the unfiltered water in such reservoir or cistern acts upon and presses the water in the filtering machine, and the unfiltered water therein having no means of escape is by such pressure speedily forced through one or other of the beds of filtering materials in the said filtering machine; and,

"Secondly, in introducing into the said filtering machine two distinct beds of filtering material, and adjusting the same therein, and admitting the unfiltered water therein in such a manner that part of the unfiltered water will pass through one of such beds and be thereby filtered, and the other part of such unfiltered water will at the same time pass through the other of the said beds and also be filtered."

[Printed, 6d. No Drawings.]

A.D. 1837, November 28.—No. 7492.

DOVER, JOHN, and JONES, WILLIAM.—"Improvements in filtering fluids."

"This invention consists in filtering fluids by causing them to pass through the skins of animals. Sheepskins are preferred. "These skins are not to be tanned, but they are to have the wool removed, and are to be treated as if they were going to be tanned." "The skins in this condition are to be laid on a suitable supporting surface." "The fluid to be clarified is to be forced into the filter by means of a force pump, or other convenient way of obtaining pressure, such as an

“ altitude of column, where it can be conveniently obtained ;
 “ or it may be obtained by a partial vacuum.”

[Printed, 6d. Drawing. See Repertory of Arts, vol. 10 (*new series*), p. 22;
 and London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 376.]

A.D. 1838, June 14.—No. 7690.

PRICE, GEORGE.—(*A communication.*)—“ Improvements in
 “ clarifying water and other liquids.”

This invention consists :—

“ First, in the application of what I call a double-branch
 “ rising main force pump to a filtering apparatus, in such a
 “ manner that it will feed the filter either for filtration by
 “ ascension or for filtration by descension, and force the
 “ liquid required to be clarified in either case rapidly through
 “ the filtering medium, and also in such manner as enables
 “ the operator to cleanse the filter or the filtering medium by
 “ means of the said pump, without necessarily taking to pieces
 “ or even opening the filtering apparatus when the said
 “ medium or filter has become foul by use.

“ And, secondly, in the use of one uniformly pulverized sub-
 “ stance only for the filtering medium, or of such substances
 “ only combined as can be brought to the same degree of fine-
 “ ness as powder, and are of the same specific gravity, or as
 “ nearly so as possible, and in the application of two very
 “ finely perforated plates at the top, and two at the bottom of
 “ the filtering medium, between which plates the medium is
 “ pressed, and by means of which the liquid to be clarified
 “ is introduced into the said filtering medium in a very
 “ minutely divided state.”

[Printed, 6d. Drawing. See Repertory of Arts, vol. 12 (*new series*),
 p. 232.]

A.D. 1838, October 11.—No. 7829.

HEATH, MATTHEW.—(*A communication.*)—“ Improvements
 “ in clarifying and filtering water, beer, wine, and other
 “ liquids.”

These improvements relate to purifying water, both with and
 without filtering. The first process is used when water is em-
 ployed for manufacturing purposes. It is effected “ by precipi-
 “ tating the heterogeneous insoluble matter contained in the
 “ water by means of a solution of the muriate of zinc. \ take

“ one part of the solution cold, and of ten degrees specific gravity, and put and mix the same in a vessel with about two hundred and fifty parts of the water to be clarified, to which must be added and mixed one-third part of a solution of salt of soda at ten degrees, which immediately produces a precipitate of the acid of zinc, which carries with it to the bottom of the vessel the other insoluble matters. At the end of a quarter of an hour the clarified water rises above the precipitate. This water is drawn off by means of a cock placed within a certain distance from the bottom of the vessel, and by means of another cock placed underneath the first one the precipitate formed by the result of the operation is drawn off also.”

“ As to the second system, purification by filtering only ; this purification is effected by means of wool, hair, and horsehair of every kind ; but I shall confine myself to the woollen matters only.” “ The wool to be particularly preferred is wool parings, or any other wool, new or old, white or colored, which has been cut, chopped, crushed, ground, or broken into pieces quite as fine or even finer than the parings of woollen stuff of any kind, and which must be scoured and cleaned by the common process of alkalis, or by the wash of potters’ earth, or by the use of both the said matters together. To these several means of effecting filtration, that by means of vegetable carbon may be added.”

Methods for scouring and washing the wool parings are set forth in this Specification.

The filtrations may be accomplished from the bottom to the top. The filter may be cleaned by throwing in water from the top, “ and making it pass in an opposite direction to that of the filtration.”

In a Disclaimer appended to the Specification the inventor disclaims the words “ clarifying, and ” in the title, also all that part relating to the first method for clarifying water. He also makes an alteration in the claim.

[Printed, 1s. 2d. Drawing. See London Journal (*Newton's*) vol. 21 (*co joined series*), p. 479, for Disclaimer.]

A.D. 1838, November 6.—No. 7855.

BEART, ROBERT.—“ Improvements in apparatus for filtering liquids.”

"My invention relates, first, to a mode of filtering liquids by means of a piston having suitable filtering materials applied thereto, whereby the piston in its movement either produces a vacuum or partial vacuum, or creates a pressure, so that the liquid is forced through the filtering material." The second part of the Specification describes the application of the above process to the making of infusions of coffee and other matters which subject does not belong to the present series of Abridgments.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 12 (*new series*), p. 80; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 107; and *Mechanics' Magazine*, vol. 31, pp. 116 and 273.]

A.D. 1838, November 8.—No. 7860.

SMALL, JOHN.—(*A communication.*)—"Improvements in filtering fluids."

"The filter may be either a square case or a cask, a vase, or anything that will contain water or other liquids; at from two to six inches" "from the bottom an iron grating or false bottom," "or a wooden one pierced with holes, must be fixed (for very small filters there is no occasion for a false bottom). Several air-holes must be made in the filter, from the false bottom upwards, to let out air, and one or more cocks fixed between the bottom and false bottom of the filter to draw off the liquids. The ingredients for filtering consist of cloth shearings, or waste of cotton will also answer when cloth shearings cannot be procured."

[Printed, 4d. No Drawings.]

A.D. 1838, December 1.—No. 7887.

COTELLE, THEODORE.—"Improvements in extracting the salt from sea and other water, and in rendering it pure and drinkable, and in purifying other water."

After passing through a distilling apparatus, consisting of a boiler, "rectifier" and condenser, the condensed water has its quality improved by a mode of filtering which forms a portion of this invention. The said mode of filtering may be used in conjunction with the evaporating apparatus, or it may be used alone.

The filter is constructed of oak, and its upper part is hermetically closed by a cover. "Any suitable filtering material

“ may be be used.” “ The water is poured into the upper
 “ part of the filter through a hopper on to a wooden plate
 “ perforated with small holes, into which are placed pegs or
 “ pins of a size not quite so large as the holes, the object of
 “ which is to prevent the water passing into this filter at too
 “ rapid a rate, and at the same time to clarify it by preventing
 “ the passage of any impurity that may yet remain in the
 “ water. The water percolates through the filtering material,
 “ and is drawn off at the bottom ;” in its passage “ through
 “ the filter the air acts upon it by means of a series of tubes
 “ which are placed within, and project from the filter, and
 “ through which the air passes, which so operates upon the
 “ water as to improve its quality and render it fit for all
 “ purposes, and give it that pure and sparkling appearance
 “ which belongs to spring water.”

[Printed, *8d.* Drawing. See Repertory of Arts, vol. 13 (*new series*), p. 133.]

A.D. 1838, December 1.—No. 7889.

PONTIFEX, WILLIAM.—“ Improvements in apparatus and
 “ materials employed in filtering and clarifying waters and
 “ other liquids.”

This invention consists “ in the use of fibrous compressible
 “ substances compressed by mechanical power between two
 “ plates held together at any required degree of pressure,
 “ dependent on the purity required for the liquid, the
 “ greatest pressure producing the greatest purity.” The
 filtering medium is placed between two perforated plates,
 and a force pump, or the pressure of a column of water, is
 employed to force the fluid to be filtered upwards through
 that medium.

[Printed, *8d.* Drawing.]

A.D. 1838, December 12.—No. 7902.

DE CROUY, HENRY, Count.—(*A communication.*)—“ Im-
 “ provements in filtration.”

These improvements relate:—1st, to introducing into the
 filtering machine “ more than two distinct beds of filtering
 “ material, and adjusting the same therein when the number
 “ of such beds is any even number, and admitting the un-
 “ filtered water or other fluid therein, in such manner that part

“ of the unfiltered water or other fluid will pass through one
 “ or more of such beds and be thereby filtered, and the other
 “ part of such unfiltered water or other fluid will at the same
 “ time pass through other of such beds, and also be filtered ;”
 2nd, to a mode for obtaining a pressure for rapid filtration
 when the fluid passes through more than one bed of filtering
 materials ; 3rd, to admitting the fluid through screw-formed
 pegs of cane or other porous material ; 4th, to preventing the
 obstruction of the filter by dirt ; and, 5th, to a method of
 cleansing the filter.

The drawings represent a horizontal cask containing four
 vertical filtering beds, supplied from an upper cistern and
 having an exit pipe that leads to a cistern somewhat less ele-
 vated. Cocks admit the water to the filtering beds. Each
 filtering bed is enclosed by perforated partitions, the perfora-
 tions being filled with screw-formed pegs of cane. Each space
 into which the unfiltered water is admitted is connected by
 means of an underneath cock to a lower vessel for receiving
 the dirt ; the dirt is removed from the latter vessel by means
 of another cock.

The filter is cleansed by forcing the water through the beds
 “ in an opposite direction ” to that in which the unfiltered
 water has previously passed.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 11, (*new series*),
 p. 154.]

A.D. 1839, December 4.—No. 8296.

CRONIER, PIERRE NARCISSE.—(*Partly a communication.*)
 —“ Improvements in filters, and in the means of cleansing the
 “ same.”

This filter contains a series of layers of sand and stone,
 placed one above the other, and through which the water passes
 in order to be filtered. A plunger is caused to create pressure
 in order to force the liquid through the filtering media, and
 also to cleanse them when they become choked or foul. A
 piece of sponge is placed above the uppermost layer of sand
 and stone.

[Printed, 6d. Drawing. See Inventors' Advocate, vol. 2, p. 371.]

A.D. 1840, February 8.—No. 8379.

BEART, ROBERT.—“Improvements in apparatus for filtering fluids.”

These improvements relate :—1st, to a “mode of combining filtering frames with a clamp frame and suitable filtering medium ;” 2nd, to a “mode of constructing fillers by means of a filter frame, covered with suitable filtering medium ;” and, 3rd, to a “mode of constructing filters by means of two surfaces of stone.”

The drawings show a vessel rectangular in plan and triangular in vertical section with a lower flat portion to which the exit cock is attached. In the flat portion clamp frames are placed containing the filtering paper or other filtering medium. The clamp frames are made with hinges, and each frame has an eduction pipe into a chamber connected to the exit cock. Other forms of this plan of filtering are shown.

In another part of the invention circular filtering frames are covered with a filtering fabric by sewing. This apparatus may be made to act as a syphon, a circular frame being covered on both sides with filtering material, and being connected to an elevated supply by a pipe that enters between the sides of the frame.

A filtering apparatus of dripstone is shown placed at the bottom of a cask. Two plates of stone are joined together at the edges so as to have a space between them that communicates with the exit cock. A number of these plates are fitted vertically to one cask.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 15 (*new series*), p. 25; Mechanics' Magazine, vol. 33, p. 238; Inventors' Advocate, vol. 3, p. 115.]

A.D. 1840, July 2.—No. 8559.

POOLE, JOHN DAVID.—(*A communication.*)—“Improvements in evaporating and distilling water and other fluids.”

“No fluid but the fluid to be evaporated or distilled is used in any of the boilers, boxes, or cisterns of the apparatus ; while by means of the boxes, cisterns, and worms in the said cisterns the evaporated or distilled fluid is always expending its heat in heating the fluid about to be subjected to the operations previous to its being pumped into the boilers for that purpose.”

The drawings represent a range of boilers set in brickwork. The first boiler in the series only has a furnace, which generates all the heat required for the apparatus. The steam generated in the first boiler proceeds through a pipe to a coil or worm in the second boiler, thence to a valve box and condensing worm; the cistern containing the condensing worm is filled with the cold water which will afterwards be distilled. The water in the second boiler is caused to give off steam by means of the coil of the first boiler, and the steam thus generated proceeds to the coil of the third boiler, and through its valve box and condensing worm, whence it may be drawn off as warm water. Any number of boilers may be connected in this way, that will expend usefully the heat generated by the furnace of the first boiler. The valve in the valve box is a float valve, and a supply pipe from the condensing cisterns proceeds along the range of boilers, so that, by means of a pump connected with the said supply pipe, and suitable cocks, any of the boilers may be supplied with feed water that is partially heated.

The boilers are fitted with water gauges, safety valves, and discharge cocks.

[Printed, 8d. Drawing. See *Inventor's Advocate*, vol. 4, p. 21.]

A.D. 1840, November 2.—No. 8675.

SCHRODER, HERMAN.—(*Partly a communication.*)—"Improvements in filters."

The filters described are such as are used as strainers for manufacturer's purposes only, but are not restricted in the Specification with regard to the liquids intended to be filtered thereby. They are composed of one or more bags. The object of the invention is "to obtain a very extensive surface of fabric as a filtering medium in a given space, and yet offer great convenience for cleansing."

The improvements are :—

1st. A mode of applying a series of bags. Each bag is plaited or gathered, its edges are bound, and it is mounted in a rectangular frame, which is introduced into its mouth. A number of bags, with the frames at their mouths, are placed side by side in a chamber with a false bottom, the frames being wedged tightly together, so that the fluid to be filtered can only pass into the bags and out at the false bottom into a small chamber to which there is an exit cock.

2nd. "Forming an outer bag with several smaller bags affixed to the bottom thereof, such smaller bags, "when at work, being drawn within the outer bag." The other arrangements are as in the first improvement, and, in each case, the outer bag when full of liquor, lies closely against the interior surface of the chamber.

3rd. Making bag filters so that each bag is drawn into itself one or more times. These filters may be made pressure filters by fastening a top fabric to the end of the supply pipe and wedging its edges tight round the sides and ends of the frames.

In another arrangement the outer or pressure bag is fastened to the supply pipe, and each of the inner bags is connected to a metallic outlet, which communicates with the chamber containing the compound bag. A band gathers the bag at the middle of its length.

[Printed, 1s. Drawings. See *Mechanics' Magazine*, vol. 34, p. 383; and *Inventors' Advocate*, vol. 4, p. 293.]

A.D. 1841, March 8.—No. 8875.

CLARK, THOMAS.—"A new mode of rendering certain waters " (the water of the Thames being amongst the number) less " impure and less hard, for the supply and use of manu- " factories, villages, towns, and cities."

This invention consists in adding lime water for the purpose of counteracting hardness in a given water. As it is of importance that neither too much nor too little lime be added, a variety of tests are described whereby the proportion of lime required may be ascertained with exactness.

In order to apply the soap test to obtain numerical results, preliminary standard solutions containing known weights of calcic chloride are employed. By means of these solutions, known strengths of solution of white curd soap in alcohol are obtained and are used to ascertain the degrees of hardness of a given water. The alkalinity of the water is ascertained by means of carefully prepared reddened litmus paper, and the alkali is neutralized by means of a weak solution of oxalic acid. To ascertain the presence of caustic, alkaline, or earthy matter, nitrate of silver is used. Having ascertained that the water is alkaline and contains calcic carbonate in solution, and thus that the water can be treated according to this invention, by the use of the above tests, the quantity of lime water to be

added to a given water can be ascertained. This having been done, the precipitate consequent on the mixture is separated by subsidence, or by subsidence and filtration.

[Printed, 6d. No Drawings. See Repertory of Arts, vol. 18 (*new series*), p. 226; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 106; Mechanics' Magazine, vol. 35, p. 251; and vol. 62, p. 155; and Inventors' Advocate, vol. 5, p. 179.]

A.D. 1841, June 23.—No. 9001.

CHESTERMAN, WILLIAM. — “Improvements in filtering liquids.”

The inventor says:—“My invention relates to a mode of constructing apparatus to be used for filtering decoctions of coffee or other matters when subjected to heat, but does not apply to filtering fluids generally.” The invention consequently does not belong to the present series and need not be further described.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 18 (*new series*), p. 83; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 104; and Mechanics' Magazine, vol. 36, p. 92.]

A.D. 1842, November 15.—No. 9520.

MAURRAS, ANDRÉ EUSTACHE GRATIEN AUGUSTE.—(*Partly a communication.*)—“Improvements in the process and apparatus for filtering water and other liquids.”

“The theory of the system of filtration to which the invention applies consists in the combination of the following principles:—

“Firstly, in employing as a filtering medium none but inert substances; that is to say, which exert no chemical action on water, as sand, or pounded freestone, or grit.

“Secondly, in retaining and compressing the substances in a close vessel, so as to form separate and compact beds or masses, to each of which the water may be conducted on either the upper or under side alternately, or on both sides at once, at pleasure.

“Thirdly, employing pressure to any extent in order to render the filtration more rapid, which pressure may be produced either by a column of water pressing upon the filtering substances or by means of a pump worked by any suitable power.

"Fourthly, the employment" "of one or more beds of filtering materials, all concurring in the same operation.

"Fifthly, the cleansing of the filter without its being necessary to take it to pieces or relaying the filtering materials.

"Sixthly, the application of the hydrostatic law by which fluids rise to their level to the elevation of the filtered water to a height exceeding that of the filtering vessel."

The invention consists in :—

1st. "The division of the closed vessel which contains the filtering materials, into several parts." Also the manner of putting the parts together "in one body of the greatest solidity."

2nd. The entrance and exit pipes form an integral part of the vessel.

3rd. Boxes to retain the beds of filtering materials compressed in compact masses.

4th. The manner of introducing and fixing the retaining boxes in the closed vessel.

5th. Arranging in the vessel a series of beds of sand progressively diminishing in coarseness.

6th. The cleansing of the apparatus with filtered water without using any other pressure than that of the unfiltered water.

7th. The method of cleansing the apparatus with a quadruple key.

8th. "The application of a safety valve in case of employing the direct pressure of any other force than that of a column of water pressing on the filtering materials."

[Printed, 1s. 4d. Drawings. See *Mechanics' Magazine*, vol. 41, p. 146.]

A.D. 1842, December 3.—No. 9539.

STUCKEY, WILLIAM HENRY.—"Improvements in filtering water and other fluids."

Compressed sponge is the filtering medium. The sponge is compressed to about one-fourth of its original bulk by being placed between two iron plates, which are drawn together by means of screwed bolts and nuts. The machine is immersed in water, and the water under the sponge rises through it to the level of the water outside the machine. "When the sponge becomes foul it may in general be readily cleansed by lifting the entire machine out of the water, when the clear water

“ which has collected above the sponge frame will rush down
 “ through it and carry off more or less of the impurities
 “ collected.”

[Printed, *6d.* Drawing. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 193; and *Mechanics' Magazine*, vol. 39, p. 17.]

A.D. 1843, January 31.—No. 9623.

CLARK, CHARLES. — “ An improved pyro-hydro-pneumatic
 “ apparatus, or means of generating, purifying, and con-
 “ densing steam and other vapours, and of extracting from
 “ vegetable substances the soluble portions thereof, as also
 “ the application of parts of the said apparatus to other
 “ heating, evaporating, and distilling purposes.”

The drawings show the application of this apparatus to convert sea water into fresh water. The apparatus consists of the following parts combined into one arrangement :—1st, a supply cistern ; 2nd, a boiler supplied by the cistern ; 3rd, “ one, two, “ or more rectifiers through which the steam is passed, and “ thereby freed from any undecomposed matters which may “ have escaped along with the steam from the boiler :” 4th, a condenser, which also aerates the resulting water ; 5th, “ a “ refrigerator for cooling and further aerating the resulting “ water.”

The cistern is placed at the top part of the condenser, and supplies the boiler by means of Hamer's self-regulating induction apparatus. The furnace is inside and concentric with the cylindrical boiler, it is supplied with fuel by means of an inclined tube, which also forms part of the chimney. A weighted cap at the top of the boiler, in the steam head, prevents priming. From the steam head the steam proceeds to a rectifier or rectifiers in succession ; these consist of horizontal cylinders in which some condensed water is collected. The condenser consists of a series of conical chambers vertically placed, communicating with one another and furnished with air tubes. The steam proceeds from the second rectifier to the top of the condenser, is converted into water, and then, by an underneath chamber, is refrigerated, aerated, and filtered.

The apparatus for spirituous liquors and for vegetable extracts are simple modifications of the above described arrangement.

[Printed, *1s.* Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 247 ; also *Mechanics' Magazine*, vol. 38, pp. 195 and 225 ; vol. 39 p. 146 ; and vol. 41, p. 360.]

A.D. 1845, January 25.—No. 10,494.

SEYRIG, JOHANN GOTTLÖB.—“Improvements in scouring, bleaching, and dyeing machines, also in machines used in filtering and in drying or extracting liquids or moisture from different substances.”

With regard to filtering, the improvements relate to an apparatus into which the liquor to be filtered is placed, and motion is then given to a drum. Centrifugal motion being imparted to the liquor, it is forced into an exterior compartment. When that compartment is filled, the liquor is forced through a filtering medium into other compartments, thence through pipes into a hollow ring, whence it can be conveyed into a proper receiver.

To cleanse the filtering medium water may be admitted into the central compartment and forced through the filtering medium by centrifugal force.

[Printed, 1s. 4d. Drawings.]

A.D. 1845, February 10.—No. 10,515.

TRUMAN, THOMAS.—“An apparatus, being an improvement for filtering and purifying water.”

Porous stone, such as dripstone, is employed in this apparatus. Filtration is effected either by the water oozing through the pores of the stone or by being sucked or forced through them. When this substance cannot be easily obtained, the filter might “be made of unglazed stoneware, or of a number of layers of cloth kept distended by strong hoops, or of two concentric metal vessels perforated all over with very minute holes, and having a space between them filled up with fine gravel and sand.”

In one instance, the vessel of porous stone has a vertical air pipe. “When it is desirable to have the filter portable, the water may be drawn off by means of a syphon.” The syphon may consist of a number of small metallic tubes, and thus act by capillary attraction, or it may be made to act by atmospheric pressure alone.

“When natural or artificial porous stone is used,, it is cleansed from time to time by hard scrubbing on the outside; and when any other medium is substituted it is cleansed in the way most suitable to the nature of that

“ medium ; water may be conveniently filtered on a large
 “ scale for shipping and other purposes on the same system,
 “ by means of an open barge or floating tank, having slabs of
 “ porous stone let into apertures made in the side of it, or
 “ having doubled-walled sides, the outer one consisting of
 “ wood, as usual, but perforated with a number of holes,
 “ and the inner one of slabs of porous stone, connected by
 “ water-tight joinings. The purified water may be pumped
 “ from the inside.”

[Printed, 10d. Drawing. See *Mechanics' Magazine*, vol. 43, pp. 97 and 318.]

A.D. 1845, March 27.—No. 10,576.

BOWSER, WILLIAM, and BOWSER, WILLIAM, junior.—“Im-
 “ provements in ships' fire hearths.”

The parts of this invention that entitle it to be included in the present series of Abridgments are :—1. The combination of a ships' hearth with “apparatus for condensing steam by
 “ the action of the water of the sea.” 2. A mode of introducing air into the condenser.

The drawings represent a boiler vertically over a fire-place, and having its interior permeated by the flues of the fire. The steam from the boiler first passes into a steam chest above the boiler, thence into the upper part of a condenser, and finally, as water, through a pipe at the bottom of a receiver which surrounds the condenser. The condensing surfaces in the condenser are corrugated, and the cold air is brought from above by means of a pipe into contact with the drops of condensed water in the receiver. An external or casing pipe encompasses the steam pipe, and creates a rapid draft of cold air through the said receiver.

[Printed, 1s. 8d. Drawings.]

A.D. 1845, December 8.—No. 10,984.

WILKINSON, JOSIAH. — (*A communication*).—“Improve-
 “ ments in filtering water and other fluids.”

“ This invention relates to a mode of filtering water and
 “ other liquids by means of pressure, and to the construction
 “ of an apparatus which is denominated a radiant filterer.”
 “ This apparatus is constructed by combining and grouping
 “ a number of perforated tubes made of metal or wood, which
 “ perforated tubes are to be filled with porous and elastic

“ filtering substances.” “ These perforated tubes surround another tube, which is perforated with smaller holes than the surrounding tubes are, and is also filled with elastic filtering substances. After the liquid has been forced through all the surrounding perforated tubes it is again forced through the centre perforated tube, which is furnished with a pipe at the top through which the filtered liquid flows. The whole group of these perforated tubes are placed in and surrounded by an outer case and recipient into which the turbid liquor is forced. This case is supplied by means of a cistern or reservoir fixed in any suitable place, but which must be considerably above the level of the filtering apparatus, as the whole process of filtering is effected by pressure.”

The elastic substance preferred is sponge.

To cleanse the apparatus, the water is prevented from arriving at the exit pipe, but the supply cock and a waste cock are opened; the deposit contained in the outer case or between the perforated tubes is thus carried away by the direct flow of the liquid through the waste cock. To effect a more complete cleansing, the perforated tubes are lifted from the case, the filtering substance forced out therefrom, and the parts separately cleansed.

[Printed, 10d. Drawing. See *Engineers' and Architects' Journal*, vol. 2, p. 222; and *Patent Journal*, vol. 1, p. 41.]

A.D. 1845, December 10.—No. 10,999.

GYE, FREDERICK, junior.—“ Improvements in preparing aerated waters, and in vessels to contain aerated and mineral waters.”

The first part of these improvements relates to the transmission of mineral waters from their source to any other place in casks. When the water is to be bottled, it is first filtered, and for this purpose a filter “ composed of alternate layers of animal charcoal and well burnt and well washed sand,” is employed; “ the water is then to be charged with carbonic acid gas, after the usual manner in which soda water is manufactured, and to be bottled in the usual way.”

The second part of these improvements relates to the corking of bottles.

[Printed, 6d. Drawing. See *London Journal (Newton's)*, vol. 28 (*conjoined series*), p. 400; and *Patent Journal*, vol. 1, p. 62.]

A.D. 1846, March 25.—No. 11,149.

SMITH, CHARLES.—“Improvements in cooking and culinary utensils, and methods of heating, and suspending or fastening articles of domestic use, and similar purposes.”

The seventh head relates to filtering, and under it a claim is made for “the apparatus for filtering” “fluids, and the full use of bent syphon tubes when filled with” “filtering materials, and the application of comminuted or laminated sponge for the same purpose, and to form absorbing and other useful articles or surfaces.”

The drawings show a filtering apparatus of earthenware. A cylindrical receiving vessel with an exit cock is covered by two other vessels. The upper of the two is conical, and contains in its lower half a piece of cloth of the shape of the bottom of the vessel, together with filtering materials. The bottom of this vessel is perforated. The lower of the two vessels forms an exterior cone to the upper vessel; it contains filtering materials, and has a perforated annular groove at its upper part, the perforations leading into the receiving vessel. The fluid to be filtered is poured into the upper vessel; it descends through the filtering materials therein, passes through the perforations at its bottom into the filtering materials in the exterior cone, upwards to the annular groove, and through the apertures therein to the receiving vessel. Finely ground biscuit ware mixed with finely powdered charcoal may be used as filtering materials.

The filtering syphon tube is of earthenware, and is filled with suitable comminuted matters. Fibrous materials confine the particles and fill up the ends, and then a tight-fitting perforated cover is applied at each end. The filtering materials are kept wet, and the action of the filter may be stopped by a screw plug at its bend.

[Printed, 8s. 6d. Drawings. See London Journal (*Newton's*), vol. 29 (*continued series*), p. 366.]

A.D. 1846, September 17.—No. 11,378.

STURGES, RICHARD FORD. — “Improvements in filtering apparatus, and in apparatus for making teapots and other vessels of metal.”

As regards filtering apparatus, this invention relates to improvements which consist in "combining certain arrangements of apparatus for filtering with cocks or taps used on a water main or other pipe supplying cisterns or other vessels with water or other liquid, so that the supply will be filtered as it flows into the vessel; and also in combining certain arrangements of apparatus for filtering with cocks or taps used for drawing off water or other fluids from cisterns or other vessels so that the fluid may be filtered as drawn off."

The drawings show a cock connected to a horizontal main pipe, and having a filtering chamber in the exit portion of the cock, which is filled with sponge for the purpose. The parts of the chamber may be unscrewed from each other in order to cleanse the sponge. In this case, the water passes downwards through the filter.

In another arrangement, the horizontal main pipe enters the side of a vertical pipe, the expansion of which forms the filtering chamber. At the bottom of the vertical pipe is a spring valve which opens under excessive pressure of water. The water ascends through a perforated diaphragm, which carries a woven twill cotton fabric, and then passes off by an upper exit pipe, that is curved so as to have its mouth downwards.

In a third arrangement, similar to the last, the filtering material on its underneath surface can be cleansed by drawing down a handle to the spring valve. The passage from the tap to the filter is contracted. The spout comes out of the side of the filtering chamber.

In a fourth arrangement, a large cylindrical filtering chamber is combined with a cock. This is capable of containing charcoal or other media.

[Printed, 2s. 10d. Drawings. See Patent Journal, vol. 2, p. 715.]

A.D. 1846, November 3.—No. 11,432.

PARISH, HENRY HEADLEY, and ROOTSEY, SAMUEL.—"Improvements in supplying and purifying water."

These improvements consist in causing rain water to flow from the roofs of houses into a reservoir, whence, after being made to pass through filtering media, it is distributed by means of a steam engine for domestic and other purposes.

The filter is divided into three compartments by means of brick walls. The first wall extends from the top of the filter-

ing chamber to the bottom, at which part there are several openings to allow of the water passing through them from the first compartment to the second compartment, from which it passes over the second wall into the third compartment, and thence into the reservoir.

[Printed, 1s. 8d. Drawings. See Patent Journal, vol. 2, p. 860.]

A.D. 1846, November 17.—No. 11,453.

MASTERS, THOMAS. — “Improvements in apparatus and means for cooling liquids, and filtering and preventing liquids freezing.”

The third part of this invention consists “of the construction of and combining certain bag filters with apparatus suitable to contain heated liquids.” The filter consists of a double bag, having a space filled with well washed pulp. There is also a conical vessel arranged for holding hot water or other fluid by means of which the matters to be filtered may be kept warm.

It is proposed to combine filtering with cooling apparatus. In these are bag filters, having each a wire hoop, which is supported at a point in each filter and pressed close down so that the unfiltered water cannot pass underneath. By either of the arrangements described water may be filtered and cooled and drawn off by a cock.

The sixth part of the invention consists of a “mode of combining apparatus for preventing water contained in a filtering cistern from becoming frozen.” This is said to be accomplished by surrounding the cistern with a casing which is filled with salt water or brine. The supply and exit pipes are similarly surrounded by casings containing brine, “so as to exclude the frost.” In order that the cistern may be supplied with air as the water is withdrawn, a pipe passes to any place from which warm air may proceed through the pipe to the cistern; this air pipe is also enclosed, together with the outlet pipe in another pipe that contains brine.

[Printed, 3s. Drawings. See Patent Journal, vol. 3, p. 3.]

A.D 1847, April 27.—No. 11,673.

WATSON, CAROLINE.—(*A communication from John Watson.*)—“Improvements in apparatus for filtering.”

"The filter consists of several frames made of three sheets of wire cloth covered with cloth, each one having a nozzle at one corner," "through which a pipe is let into the inside. The nozzle is tied tightly over the pipe, so that if the filter were immersed in water none could get to the wire cloth except through the cloth; and if the filter were immersed in water, and the pipe were connected with the suction pipe of a pump, on the pump being moved it would draw the water through the cloth, thus filtering it." What is claimed as novel, is a "method of cleaning and renewing a filtering surface by the combined action of a stream of water or other fluid running the reverse way to that in which the filtered liquid passed, and a brush or scraper moved on the dirty surface of the filter."

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. 11 (*enlarged series*), p. 298; Artizan, vol. 9, p. 30; and Patent Journal, vol. 4, p. 130.]

A.D. 1847, October 21.—No. 11,919.

SMITH, BROOKE, and STURGES, RICHARD FORD.—An "improvement or" "improvements in apparatus for filtering."

This invention consists, 1st, in filtering apparatus so arranged in connection with a cock or pipe that the filtering process may be reversed in order to cleanse the apparatus; 2nd, in so arranging a cock or valve external to the filter that the same cleansing process may take place without disconnecting the filter; 3rd, in attaining the same result by means of a cock or valve placed inside of the filter, (two screws regulate the position to which the plug of the cock may move); and 4th, in "applying a flexible and elastic pipe or tube in combination with filtering apparatus."

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1848, December 28.—No. 12,395.

NEWTON, WILLIAM EDWARD.—(*A communication from Charles M. Keller.*)—"Improvements in steam engines."

The first part of this invention refers to the method of working steam engines.

The second portion refers, in part, to condensing "the waste or blow off steam from the boiler to supply the waste arising from leaks, and also for the production of fresh water for any other use." In the fresh-water apparatus, the

steam passes through the tubes of a tubular condenser, the outside of the said tubes being cooled by a current of water taken from the outside of the ship or vessel. The invention consists in combining a condenser of the engine that propels the vessel with a pump (rotary or otherwise) that forces the water from the outside of the vessel through the said condenser, the pump being worked irrespective of the propelling engine, by means of an auxiliary engine, whereby the amount of condensation is rendered independent of the working of the propelling engine.

This portion of the invention also consists in a double connection of the condenser, "that is with the exhaust of the " propelling engine and with the boiler, when the said condenser is combined with a pump that receives the condensing water from outside of the vessel, and is impelled by " an auxiliary engine."

Finally, this portion of the invention consists in connecting the tubes with the external case of the condenser, by attaching the diaphragm that carries one end of the tubes to the said case by means of a conical ring; by this means allowance is made for contraction and expansion.

[Printed, 1s. 4d. Drawings. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 249; *Mechanics' Magazine*, vol. 51, p. 18; *Patent Journal*, vol. 7, p. 138; and *Engineers' and Architects' Journal*, vol. 12, p. 369.]

A.D. 1849, April 2.—No. 12,556.

Mc BRIDE, WILLIAM, junior.—(*A communication.*)—"Improvements in the apparatus and process for converting " salt water into fresh water, and in oxygenating water."

This invention consists in "the condensing of the steam or " vapour arising from heated sea water, brine, or other salt " water, in a strong current of cold air, which gathers the " escaping steam into it by means of a blowing or other exhausting apparatus."

The drawings represent a steam pipe from a boiler that is supplied with sea-water, in connection with a zig-zag tube enclosed in a case filled with cold water—forming a condenser. The other end of the zig-zag tube is connected by a tight joint to a pipe which leads to the fan box of the exhausting apparatus. One of the features of the invention is that the steam pipe

"approaches very near to but without touching the mouth" "of the zig-zag tube." The zig-zag tube is in two compartments, one descending to the bottom of the condenser, the other ascending. At the lowest point of the zig-zag is an exit for the condensed steam into a receiving vessel; the steam pipe and the exhaust pipe are respectively in connection with the two upper terminals of the zig-zag.

The combined action of the pressure of steam, and of the exhaust apparatus, causes the steam mixed with cold air to rush into the zig-zag, the condensed steam falling (as fresh cold water) into the receiving vessel.

The blowing apparatus is another feature of the invention, and consists of a cylindrical fan box with a three-armed fan, mounted on an axis, with an escape passage for the exit of the air.

A Disclaimer was filed on July 7, 1849, disclaiming the words in the title "and in oxygenating water."

[Printed, 1s. Drawing. See Repertory of Arts, vol. 20 (*enlarged series*), p. 141, and p. 144 for Disclaimer; Mechanics' Magazine, vol. 51, p. 333; Practical Mechanics' Journal, vol. 2, p. 135; and Patent Journal, vol. 8, p. 32.]

A.D. 1849, April 26.—No. 12,592.

HORSLEY, JOHN. — "Improvements in preventing incrustation in steam and other boilers; also for purifying, filtering, and otherwise rendering water fit for drinkable purposes."

In the first instance, the hardness of the water is ascertained by test, using for that purpose oxalate of ammonium or oxalate of potassium.

In order to purify water by removing therefrom calcareous matter, calcined or caustic barytes, phosphate of soda, oxalic acid, or one of the various preparations of these substances are added to it. After the water has been thus treated, filtering "is almost unnecessary; but the separation of the transparent "and supernatant water can be accelerated (after subsidence "of the precipitate) by decantation or drawing off by means "of a syphon combined with an exhausting syringe."

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 35, (*conjoined series*), p. 335; Mechanics' Magazine, vol. 51, p. 430; and Patent Journal, vol. 8, p. 82.]

A.D. 1849, August 1.—No. 12,730.

MURDOCH, JAMES.—(*A communication.*)—"Improvements
" in converting sea water into fresh, and in ventilating ships
" and other vessels, applicable also to the evaporation of
" liquids, and to the concentration and crystallization of
" syrups and saline solutions."

1st. "Accelerating the evaporating of the water in the distilling vessel by creating a current of air over the surface of the water by means of an exhausting fan, in conjunction with a peculiarly constructed condenser."

2nd. "An improved evaporating vessel, having a very extended heating surface."

3rd. The ventilation of ships.

The drawings show an arrangement adapted to a ship's cooking range for converting salt water into fresh. At the upper part of the evaporating vessel is a tube which admits air by means of numerous small holes. The steam pipe from the boiler proceeds downwards to the condenser upon a lower deck. The condenser is furnished with wire gauze discs in vertical pipes that deliver the water of condensation into a vessel in communication with the distilled water exit passage by means of a syphon tube. An exhausting fan is connected to the condenser, in such a way as to draw air as well as steam from the evaporating vessel, leaving the distilled water in the condenser and expelling the air to ventilate the ship.

A larger arrangement with an evaporating vessel composed of zig-zag compartments, and having the exhausting fan fixed in the cover, is also shown.

[Printed, 10d. Drawings. See *Mechanics' Magazine*, vol. 52, p. 115; and *Patent Journal*, vol. 8, p. 259.]

A.D. 1850, June 24.—No. 13,149.

LAIRD, WILLIAM.—(*Partly a communication.*)—"Improvements in lifeboats, and in apparatus for filtering and purifying water."

"In a cistern of water or other fluid to be clarified, I place
" a hollow or porous stone filtering vessel, made in two or more
" parts cemented together. This stone vessel I surround on
" all sides at a convenient distance with jackets of perforated
" zinc, galvanized iron, or other perforated metal or wire
" work. This jacket consists of two surfaces, the space

“ between them being filled with animal charcoal, or substance
 “ possessing antiseptic qualities.” “ The ” stone “ vessel
 “ is provided with a tap and pipe for drawing off filtered
 “ water, and an air pipe to allow the water to run off freely.”

[Printed, 10d. Drawings. See Repertory of Arts, vol. 17 (*enlarged series*),
 p. 97; Mechanics' Magazine, vol. 54, p. 16; and Patent Journal, vol. 10,
 p. 190.]

A.D. 1850, September 12.—No. 13,254.

PRICE, ASTLEY PASTON, and WHITEHEAD, JAMES HEY-
 WOOD.—“ Improvements in filters.”

“ Our invention consists :—

“ First, of making a tubular fabric into a filter by drawing it
 “ within itself.

“ Secondly,” “ of making filters by drawing one tubular
 “ fabric into another, in such manner that the filtration shall
 “ be inwards as well as outwards.

“ Thirdly,” “ of making filters by drawing a bag into itself,
 “ and then into an external sheath or case of small diameter
 “ as compared with that of the tubular fabric. And,

“ Fourthly,” “ the manufacture of filters ” of fabrics “ com-
 “ posed of a combination of cotton yarn and woollen or worsted
 “ yarn,” “ of a mixture of flax and cotton carded and spun
 “ together; also of the employment of such yarn of a mixture
 “ of cotton and flax combined with woollen or worsted yarns;
 “ and also the employment of yarn composed of wool and cotton
 “ carded and spun together; and also the employment of yarn
 “ composed of flax and wool, or of cotton, flax, and wool carded
 “ and spun together.”

[Printed, 8d. Drawing. See Repertory of Arts, vol. 17 (*enlarged series*),
 p. 202; London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 252;
 Mechanics' Magazine, vol. 54, p. 257; Engineers' and Architects' Journal,
 vol. 14, p. 190; and Patent Journal, vol. 10, p. 250.]

A.D. 1850, September 19.—No. 13,256.

BROOMAN, RICHARD ARCHIBALD.—(*A communication.*)—

“ Improvements in purifying water and preparing it for
 “ engineering, manufacturing, and domestic uses.”

This invention consists :—

“ Firstly, in freeing the water from all matters capable of
 “ being precipitated by boiling before the introduction of the
 “ same into the boiler or other steam-generating vessel.

"Secondly, in the employment of chemical reagents exactly suited in each case to the quality of the water required to be purified.

"And, thirdly, in the application of the said preliminary process and the said chemical reagents to the purification of water generally, whether intended for subsequent boiling or any other purpose whatever.

"The preliminary purification of the water is effected by the treating it on a large scale in cisterns, tanks, or other suitable reservoirs, altogether separate and distinct from the vessels to which the water is to be transferred for actual use or delivery. These reservoirs are fitted interiorly with an agitator or agitators, by which the water is kept in a state of agitation while the chemical reagents are being added. The working of the agitators is then stopped, and the foreign matters are allowed to precipitate. In about four hours the precipitation will have taken place, and the clear and purified water may be drawn off for use.

Amongst the reagents to be used, great stress is laid upon lime and chloride of barium. In some cases, "it may be expedient to subject the water to subsequent filtration through charcoal and other media, as, for example, where the water is designed for domestic use, or for some manufacturing purposes where great purity is desirable, as brewing, dyeing, &c."

[Printed, 10d. Drawing. See *Mechanics' Magazine*, vol. 54, p. 211; and *Patent Journal*, vol. 10, p. 278.]

A.D. 1851, February 11.—No. 13,507.

BRIAND, GEORGE, and FELL, RICHARD.—"Improvements in obtaining fresh and pure water from salt, sea, and other waters."

In this invention a continuous current of salt or impure water is passed "through a cylinder (or cylinders) heated externally by steam or hot air, and divided internally into compartments;" "the resulting vapour" is then aerated "by means of an aerating vessel enclosed in a condenser."

The drawings show a cylinder, connected, on the one hand with a supply box, and on the other with a condensing and aerating vessel. The supply box is open at the top and is

supplied by means of a tap ; it has a hood over the pipe that leads to the cylinder or boiler, by which free communication from the interior of the cylinder with the external atmosphere is entirely cut off in that direction. The cylinder is surrounded by a steam jacket and has three horizontal partitions, each partition being turned up at one end so as to allow the water to flow in one direction only, and then to drop upon the next partition. The condenser consists of a cylindrical vessel contained within a close tank.

The impure water that flows along the compartments of the cylinder is successively vaporized and goes to the condenser where it gets mixed with air by means of a pipe that is specially provided for that purpose, and is condensed (by contact with the sides of the condenser) into pure fresh distilled water.

[Printed, *ed.* Drawing. See *Mechanics' Magazine*, vol. 55, p 121 ; and *Patent Journal*, vol. 11, p. 296.]

A.D. 1851, March 31.—No. 13,577.

GWYNNE, JOHN.—“Improvements in machinery for pumping, forcing, and exhausting of steam, fluids, and gasses, and in the adaptation thereof to producing motion, to the saturation, separation, and decomposition of substances.”

The twenty-seventh part of this invention refers to “the application and use of separate or detached cages or receivers for centrifugal drying and separating apparatus.” This part of the invention has relation to the adaptation of the inventor’s centrifugal apparatus for drying, filtering, washing, &c., various substances. The filtering medium is held in a detached cage in connection with a vertical perforated tube that revolves with the main shaft. The movable cage may be either of wire gauze or of perforated metal. These cages being removeable and being more than one in each machine, they may each contain separate materials, and be separately employed ; they are represented as segmental in cross section. The liquid to be filtered is supplied to the perforated vertical pipe or cylinder by a small fixed lower horizontal pipe. As the liquid rises within the cylinder, “it rushes out through the perforations therein into the central space enclosed by the inner sides of the series of cages,” which with the shaft being made to revolve at a high velocity, the liquid is forced centrifugally through the filtering medium within the cages,

“ after passing through which it falls into a circular reservoir
 “ beneath, in readiness for use.”

[Printed, 8s. 10d. Drawings. See *Mechanics' Magazine*, vol. 55, p. 299;
Practical Mechanics' Journal, vol. 4, pp. 107, 121, 136, and 147; *Engineers'*
and Architects' Journal, vol. 14, p. 474; and *Patent Journal*, vol. 12,
 p. 37.]

A.D. 1851, May 8.—No. 18,625.

NEWTON, WILLIAM EDWARD.—(*A communication*).—“ Im-
 “ provements in apparatus for the generation or condensation
 “ of steam for various useful purposes; also improvements
 “ in certain parts of engines to be worked by steam, air, or
 “ gases.”

The third part of this invention “ relates to a method of
 “ producing fresh water on board of steam ships by the con-
 “ densation of steam from the main boilers or from an auxi-
 “ liary boiler. And this part of the invention consists in
 “ combining a tubular condenser with the main boilers of a
 “ steam ship or other vessel, and with an auxiliary boiler
 “ specially adapted to the purpose, and with an auxiliary
 “ steam engine and water pump, which said auxiliary engine
 “ has also a double connexion so as to take steam either from
 “ the main boilers of the ship or from the auxiliary boiler, by
 “ means of which combination fresh water is produced from
 “ the main boilers when these are in use for the purposes of
 “ propelling the ship, and then, without the necessity of
 “ using the auxiliary boiler, and when by accident or other
 “ cause the main boilers are not in use, the requisite supply
 “ of water can be obtained by the use of the auxiliary boilers.
 “ And this part of the invention also consists in combining
 “ with the lower ends of the tubes of the condenser a filter,
 “ through which the water shall pass as it is discharged, so
 “ that it may be cleansed of such impurities as may have
 “ been imparted to it in the apparatus.” The condenser of
 this arrangement “ is composed of an outer case with tubes
 “ inside in the manner of what is generally known as Hall's
 “ condenser. The tubes are arranged in two series, and the
 “ steam descends through one series and ascends through the
 “ other series.”

[Printed, 1s. 4d. Drawings. See *London Journal (Newton's)*, vol. 39 (*con-
 joined series*), p. 506; *Mechanics' Magazine*, vol. 55, p. 415; and *Patent
 Journal*, vol. 12, p. 97.]

A.D. 1851, August 7.—No. 13,714.

DE NORMANDY, ALPHONSE RENÉ LE MIRE, and FELL, RICHARD.—“Improved methods of obtaining fresh water from “ salt water, and of concentrating sulphuric acid.”

1st. An apparatus for distilling fresh water from salt water by means of a steam heated chamber that contains several chambers to which the salt water is admitted and of peculiar construction. A contrivance, attached to this chamber enables atmospheric air “to mix with the aqueous vapor resulting from “ the evaporation of a portion of the salt water operated “ upon.” At the same time, the apparatus produces a certain “ quantity of ordinary non-aerated distilled or fresh water “ resulting from the condensation of the steam admitted into “ the exterior chamber.”

2nd. An apparatus employed for concentrating sulphuric acid.

The drawings show an apparatus for distilling sea water, which consists of a supply tank with hood, a cylinder or casing with steam supply and containing discs, or evaporating chambers, ranged one above the other (each disc carrying enclosed partitions in connection with the supply pipe either directly or indirectly), a general tube, in connection with the exit tubes of all the discs (each discs having its own exit tube), and a condenser. The general tube is vertical, and is furnished with a central air tube, which aerates the steam as soon as it is produced. The condenser consists of a cold water casing containing a U-shaped tube having an exit at the bottom; one vertical limb of the said tube is connected to the general tube, the other has communication with the external air. The supply tank is furnished with water that has already passed through the casing of the condenser.

[Printed, 1s. Drawings. See Repertory of Arts, vol. 19 (*enlarged series*), p. 158; Mechanics' Magazine, vol. 55, p. 155; and Artizan, vol. 10, p. 65.]

A.D. 1852, February 2.—No. 13,949.

THOMPSON, FREDERICK PHILIP.—“Improvements in filtering and preserving water.”

This invention consists in “the formation of a covered “ storage reservoir ” “for filtered water, by the construction “ of the filtered water chambers extending over the area of

“ the reservoir, and the covering of this area by the filtering media, thereby forming, as it were, a subterranean filtered water reservoir, by which means the filtered water will be obtained and preserved in a state of coolness, great purity, and free from contamination.”

The drawings show a reservoir and filter bed, divided into compartments and resting on piers that support the archings of the filtered water chambers. There are likewise deposit wells with hinged or movable gratings, air shafts, and man-holes.

[Printed, 1s. 2d. Drawings. See Repertory of Arts, vol. 20 (*enlarged series*), p. 226; Mechanics' Magazine, vol. 57, p. 156.]

A.D. 1852, September 23.—No. 14,300.

MATHIEU, FRANÇOIS.—(*Partly a communication.*)—"Improvements in apparatus for containing, aerating, refrigerating, filtering, and drawing off liquids, and in ornamenting such apparatus."

These improvements relate, 1st, to a mode of refrigerating liquids; 2nd, to constructing and arranging aerating tubes; 3rd, to "the protecting and ornamenting of glass and other fragile vessels by a metallic coating deposited by the electro-galvanic process;" 4th, to the construction "of stop-cocks for 'lavoires' or other vessels wherein the mere contact of the vessel to be filled effects the flow of the liquid; also, the arrangement whereby the cock is closed by the weight of the vessel when filled; 5th, to the construction of a stop cock consisting of a screwed key of large pitch fitting into a correspondingly screwed socket and packed internally with metal and leather;" and, 6th, to the construction of portable filters, consisting "in the application of porous stone shaped to represent an ordinary bottle, but mounted with metal at its upper portion."

"The filter may be of the form of a bottle or of any other design, according to the taste of the purchaser. The stone for making the filter is hollowed out internally so as to form a reservoir for the filtered water. These filters may be used in the ordinary manner, *videlicet*, with charcoal, sand, sponge, &c. Various other forms may be very advantageously employed, such as a flat disc fitted with suitable

“fastenings into the bottom of a bucket or pail in place of a wooden bottom, or into a ‘lavoir.’”

The drawings show a water bottle, and “a pocket filter for journeys, fitted with a flexible tube to drink with.”

[Printed, 1s. 8d. Drawings. See *Mechanics' Magazine*, [vol. 58, p. 207; *Practical Mechanics' Journal*, vol. 6, p. 69; and *Artizan*, vol. 10, p. 254.]

A.D. 1852, November 27.—No. 14,349.

POCOCK, LEWIS.—(*A communication.*)—“Improvements in rendering sea and other water pure.”

The water is chemically acted on, then distilled, then again chemically acted on, and filtered.

The chemical features of this invention “are the introduction of chemical agents for the purpose of separating the salts of lime, magnesia, and all the other salts capable of forming with the hydrate of potass, or the hydrate of soda, insoluble oxides, such as oxide of lime, and oxide of magnesia, and by a small excess of these hydrates to prevent incrustation or adhesion to the boiler or other vessels used in the process of distillation; afterwards to introduce a very small quantity of an hypo-chloride, to render the distilled water palatable and wholesome, and proper for all domestic and industrial purposes; finally, to pass the whole through a filtering medium of animal or vegetable charcoal, to further improve its condition.” The inventor does not “claim the precipitation of the impurities when separately considered, but only when combined with the additional processes herein explained.”

No detailed description of the filter is given.

[Printed, 8d. Drawing.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 5.—No. 220.

BROWN, DAVID STEPHENS.—“An improved apparatus or instrument for evaporating or distilling liquids.”

This apparatus is for evaporating and distilling liquids in a vacuum. It consists "in its simplest form of a tube, open " at both ends, made in the form of a horseshoe, the three " sides of a square, or the two sides of a triangle, and having " its legs of sufficient length to prevent the pressure of the " atmosphere from forcing the liquid to be evaporated or " which has been distilled to the top of such tube, when it is " placed in a vertical position with its two ends downwards, " and having a vacuum inside."

In one drawing an arrangement is shown in which each of the lower ends of the said horseshoe-formed tube dip into an open bucket. One of the arms of the horseshoe contains the water to be distilled, the air being exhausted from the interior of the apparatus, and the said arm being heated by a worm or otherwise. On the heating of the liquid the steam of it passes " through the cross cylinder " into the other arm where it may be condensed either by a jet of cold water, or by the external application of wet cloths. A current of cold water may be passed over the cross cylinder by means of a syphon.

In the second drawing, the evaporating arm of the horseshoe is closed and has a short side pipe turning upwards to make the water seal. A chimney stack passes through this arm. The lower part of the other arm is enlarged to receive a quantity of dry sand. This sand is said to absorb the vapour of the liquid to be evaporated.

[Printed, 6d. Drawing.]

A.D. 1852, October 6.—No. 275.

DE NORMANDY, ALPHONSE RENÉ LE MIRE. — "Improve-
ments in obtaining fresh water from salt water."

"This invention has for its object an improved construction
" of evaporating and condensing apparatus, which consists of
" a cylinder or other convenient form of vessel, having within
" it two partitions near to the top and bottom respectively
" through which several tubes or passages are fixed, so that
" water may flow from below upwards and fill the tubes;
" steam is admitted to the space between the two partitions,
" and the condensed water is drawn off below. The heat of
" the steam causes the water in the tubes or passages to be
" evaporated, and the vapour is partly condensed in a dome

“ above, and the condensed water is prevented returning, but passes off with the vapour [into a second cylinder or compartment having one or more water spaces where the vapour is condensed. The condensing salt water flows first into the second apparatus, and from it into the bottom of the first-mentioned apparatus, where the water is kept to the proper level by an external stand pipe.”

According to the method by which the sea water is admitted and discharged, a pseudo-syphon tube being used in the discharge passage and connected at the bottom of the inner cylinder, “the excess of sea water which is continually running off is more salted than when it first entered it.” The cock admitting the sea water should be so adjusted that the quantity of sea water admitted into the tubes not only makes up for the quantity evaporated, but moreover allows a continuous flow through the syphon equal to the quantity of fresh aerated water which issues from the small cistern appointed to collect the fresh water “whereby a deposit of salt in the apparatus is obviated.”

As the air contained in the sea water used for condensing is not able to escape, it penetrates into the cylinder, where it becomes mixed with the steam evolved from the sea water, and the result of the condensation of this steam is aerated fresh water.

[Printed, *8d.* Drawing.]

A.D. 1852, October 30.—No. 589.

DANTEC, WILLIAM.—“Improvements in preventing incrustation in steam boilers.”

This invention consists in decomposing and separating the sulphate of lime in the water. This is done by the use of a precipitating agent, such as caustic baryta, or soluble salts of baryta, including sulphuret of barium, or, in place thereof, oxalate of ammonia.

The precipitate formed by the addition of any of the above-mentioned salts is separated from the water, by the use of a filter or otherwise.

“The filter I prefer to use consists of powdered charcoal between surfaces of hair cloth, but others may be used.”

[Printed, *4d.* No Drawings.]

1853.

A.D. 1853, January 1.—No. 1.

WILKINSON, WILLIAM.—“Improvements in taps and other apparatus for filtering and drawing off liquids.”

1st. The improved taps are made of glass or of a combination of metal and glass. “I take a quantity of molten glass and dress or coat it in suitable moulds, which give to the tap its external shape. The passage for the liquid may be either blown in the usual manner in forming articles of glass, or it may be bored out after the tap or cock has been cast and properly annealed.”

2nd. An arrangement is shown whereby, on opening a tap, air is admitted into the vessel from which liquid is to be drawn. Two modes of effecting this are described.

3rd. The improved filter consists of an outer cylinder composed of suitable material and perforated with holes to allow the liquid to percolate through to the interior. “This cylinder is fitted with perforated discs, covered with one or more thicknesses of linen or other textile fabric.”

“When the filter has become too much clogged up with impurities the discs may be taken out and washed, when it will be again ready for use.”

[Printed, 10d. Drawings.]

A.D. 1853, January 15.—No. 106.

VION, HIPPOLYTE CHARLES.—“Improvements in apparatus for refrigerating.”

One application of this invention relates to the production of pure water by the precipitation of salts from sea water.”

“This invention consists in the production of cold by the evaporation of liquids, & more particularly of liquified gas.” The apparatus comprises :—A suction and forcing pump entirely immersed in a tank filled with cold water cooling the interior and exterior of the cylinder. Two recipients placed alternately in communication with the suction and compressing valves of the pump by two pipes, and by means of cocks. Two vessels in which the substances to be operated upon are placed.

“The boiling point of water, the same as the point of congelation of the water, is in accordance with the pressure

“ which it bears ; thus under a pressure of three atmospheres
 “ the water is congealed at less than forty degrees. Supposing
 “ that water charged with a salt which it is desired to pre-
 “ cipitate, is to be operated upon, and which is still soluble in
 “ water below zero, this liquid is submitted to a pressure of
 “ three atmospheres.” In this case the water will not be
 congealed at less than forty degrees. “ Then when the
 “ thermometer indicates twenty degrees below zero, if the
 “ precipitating vat be lowered, the water will quickly abandon
 “ its latent heat, a small portion is congealed at the surface
 “ of the precipitated salt, and the water above this layer of ice
 “ will be at an elevated temperature ; the water being removed,
 “ the layer of ice raised, the salt will be found at the bottom
 “ of the vat.”

[Printed, 1s. 6d. Drawings.]

A.D. 1853, February 25.—No. 481.

COSSUS, ANTONIO FEDELE.—“Improvements in filters.”

“ This invention consists of making a cylindrical or other
 “ form of open frame, into the openings of which frame pieces
 “ of carefully burned charcoal (cut across the grain) are fixed,
 “ and such frame is fixed within a close cylinder ; into the
 “ cylinder the liquid to be filtered comes, and by preference
 “ outside of the framed charcoal ; the fluid, as it filters there-
 “ from, passes into the frame of charcoal, and is run off
 “ therefrom ; or such framed charcoal may be placed in a
 “ cistern or other vessel.”

A filter is shown that is complete in itself, and another
 arrangement that is supplied from an elevated cistern.

[Printed, 6d. Drawing.]

A.D. 1853, March 13.—No. 622.

FONTAINEMOREAU, PETER ARMAND le Comte de.—(*A communication.*)—“ A new or improved apparatus for filtering
 “ liquids.”

This invention consists “ of a tube or vessel of felt, or other
 “ flexible filtering material or fabric, having an internal sup-
 “ port to prevent it from collapsing” “ consisting either of
 “ a helical or corkscrew-formed coil of wire, or a perforated
 “ tube of tin plate or other metal.” “ When the filtering tube

“ is made of a material possessing sufficient rigidity to resist
 “ the pressure to which it will be subjected, an internal
 “ support is unnecessary. The said tube or filter is closed at
 “ one end, and furnished at the other with a tap or other
 “ outlet, the said filtering tube or vessel being placed in the
 “ liquid to be filtered, and the said tap or outlet passing to
 “ the exterior of the vessel containing the liquid to be filtered.
 “ The said liquid passes from the exterior to the interior of
 “ the said filtering tube or vessel, and runs from the said tap
 “ or outlet.”

The filtering frame may be either fixed or removable, and, when charcoal is used, it may be placed between two filtering tubes, one within the other.

[Printed, 6d. Drawing.]

A.D. 1853, April 13.—No. 893.

BOWDITCH, WILLIAM RENWICK.—(*Provisional protection only.*)—“Improvements in purifying water.”

“ This invention consists of applying clay and alkali to water,
 “ and then subjecting the same to be filtered through a
 “ charcoal or other filter.”

[Printed, 4d. No Drawings.]

A.D. 1853, April 14.—No. 907.

GUY, ALFRED.—(*Provisional protection only.*)—“An improved filter.”

The object of this invention is to make ordinary domestic water cans answer the purpose of filters for the water conveyed in them. “This is effected by making the same with two
 “ bottoms, or a compound vessel to contain two qualities of
 “ water, the one filtered the other unfiltered; and I construct
 “ such said cans with two spouts, for pouring out whichever
 “ quality of water I require.”

It is also “intended to apply” this invention “in the construction of fixed vessels, such as cisterns, as well as to
 “ portable vessels.”

[Printed, 6d. Drawing.]

A.D. 1853, April 26.—No. 999.

SLATE, ARCHIBALD.—(*Complete Specification, but no Letters Patent.*)—"An improved filter for water and other liquids."

This filter is composed of a top piece, a bottom piece, an intermediate case, a hollow piece of filtering material, and a movable bow frame having a tightening screw in the top of the bow, and two eyes in the ends of the bow moving round pivots in the bottom piece; in the bottom piece are the inlet and outlet taps, and in the top piece are the filtered water tap and the filtering material secured by a cement joint. The water enters through the inlet tap, the outlet one being shut, passes through the filtering medium, and escapes at the filtered water tap. "If the water is at all tainted, a thin layer of charcoal should be placed in the bottom," "between which and the stone a space has been left for that purpose." "When water is required unfiltered, it is drawn at the" outlet "tap, which may also be used for washing the filter."

The drawings also show filters arranged upon a large scale. The filters may be "so arranged that the pressure of the water can be reversed, so as to wash the filtering material clean, when composed of sand, rammed in concentric cases between perforated metal plates," "or of stone or other filtering material, secured by metal frames or loops."

[Printed, 1s. Drawings.]

A.D. 1853, April 27.—No. 1007.

DE FONVIELLE, GEORGE FERDINAND.—"A filtering machine, which acts under water, and is applicable to the filtering of all liquids."

This apparatus consists of a metallic cylinder "perforated at its upper part with small holes, through which the fluid enters after it has passed through a coarse fabric with which they are covered." "After entering the perforated cylinder the fluid passes through a stratum of wool or other fibre, sponge, or other substance of a similar nature; then through a stratum composed of pounded charcoal, mixed with small stones or grit; afterwards through another stratum of wool or similar substance, when it arrives at a bed of pebbles, from which it passes through a tube into another cylinder or vessel smaller than the first, to the bottom of which the tube of communication passes, which tube is perforated

“ with small holes in all that part which is contained within
“ this vessel. Round this tube wool or other matter is
“ packed so as to fill the vessel, and so that the fluid which
“ comes through the tube has to pass through the wool
“ before it can issue from the vessel through its side, which is
“ perforated.”

[Printed, 6d. Drawing.]

A.D. 1853, April 27.—No. 1018.

PALIN, JOSEPH, and SIEVIER, ROBERT WILLIAM.—(*Provisional protection only.*)—“Improvements in distillation, and
“ in apparatus connected therewith, which apparatus is also
“ applicable to other purposes in which substances are to be
“ treated by the assistance of a vacuum.”

These improvements consist, firstly, in the use of an air pump or other known means for withdrawing air from the vessel which receives the products of distillation; and, secondly, in obtaining a vacuum in a chamber containing substances to be treated in vacuo by opening a communication with a vessel in which a vacuum is formed by the condensation of steam. Amongst the uses specified for the vacuum are “assisting the operations of evaporation,” and “facilitating the process of filtration,” but it is not mentioned whether the production of fresh water is intended in either case.

[Printed, 4d. No Drawings.]

A.D. 1853, April 29.—No. 1046.

WITTHAFF, HENRY.—(*A communication.*)—(*Provisional protection only.*)—“Improvements in filters.”

This invention consists in constructing filters of the form of bottles and jugs. When these are partially immersed in the water to be filtered, “the water filters through into the interior of the
“ filter vessel, and such filter vessel may be lifted from the
“ unfiltered water, and the filtered water therein may be
“ poured out; or, by having a flexible tube connected with
“ the filter vessel, the clear water may be drawn up to drink,
“ or be run off in the manner of a syphon. The filter vessel
“ is made of stone to the shape desired, the bottom being
“ closed, and at the upper part a neck or spout of metal is
“ affixed.”

[Printed, 4d. No Drawings.]

A.D. 1853, May 18.—No. 1227.

RYAN, JOHN.—“An apparatus for purifying liquids in a ready and economical manner.”

This apparatus consists of a compound tap, “to a duct or way whereof is to be attached a purifying or filtering chamber or receptacle filled with sponge, powdered charcoal, or other purifying or filtering medium or depurator, from which purified or filtered liquid can be drawn off, and such cock or tap may be provided with another duct or way, wherefrom unfiltered liquid may be drawn off, so that unfiltered or unpurified water or liquid may thus be obtained from the same cock or tap as the filtered or purified water or liquid.”

Perforated plates may divide the sponge from the charcoal or other filtering medium.

The drawings represent a portable apparatus, also a two way cock from which either filtered or unfiltered water can be drawn.

[Printed, *8d.* Drawings.]

A.D. 1853, June 4.—No. 1382.

NASH, THOMAS RUSS.—“Improvements in filters.”

This invention relates to tubular filters, and consists in improvements on a filter, for which William Murray obtained protection under the Designs Registration Act, on the 8th of April 1850.

“These improvements are,—First, the addition to tubular filters of a finely perforated conical tube, or of a sheet of wire gauze formed into the shape of a conical tube, and,

“Second, a means of readily fastening and unfastening the parts of the barrel in which such filters may be placed.”

The means employed for the latter purpose are “flanges and screws.”

The drawings show a tubular filter inserted in an outer barrel. A roll of flannel, or other suitable filtering medium, is attached to the socket pieces of a perforated cylindrical tube which surrounds the conical tube. There is one tap for drawing off the filtered liquid, and another for drawing off unfiltered liquid. The apparatus is shown fitted inside a cistern.

[Printed, *8d.* Drawings.]

A.D. 1858, June 23.—No. 1531.

FONTAINEMOREAU, PETER ARMAND le Comte de. — (*A communication.*)—"A new distilling apparatus."

The object of this invention is to convert sea water into potable water; in the said apparatus the heat may also be employed for culinary purposes, and "the latent caloric of the " steam may be rendered available for the formation of fresh " steam."

The apparatus consists of two cylinders on the same foundation plate, and a cooking apparatus. One cylinder, the generating cylinder, encloses the fire-box and the ash-pit, the fire-box being surrounded by water. The steam escapes from the top of the generating cylinder by means of a pipe which leads to the second cylinder or receiver, where it is condensed by means of hollow brass discs, which the condensing steam traverses until the water thence arising arrives at the discharge cock. The pipe that brings the refrigerating water into the condenser is in communication with the sea.

Another arrangement is shown in the drawings "for the " double application of the same caloric."

When the condenser is below the water line, it communicates with the sea by means of two pipes, an upper one and a lower one. The cold water is constantly introduced by the bottom pipe, and the hot water discharged by the upper one. "The " alimentation takes place at the upper extremity of the refrigerator by means of a small pump which draws in the water " already heated to a high temperature. This second distilling apparatus can be constructed separate from the " generator, that is to say, the latter can be set between decks, " and the double distilling parts in the hold communicating " together by means of two pipes for steam and water."

[Printed, 1s. 2d. Drawings.]

A.D. 1853, September 23.—No. 2201.

DANTEC, WILLIAM.—(*Provisional protection only.*)—"Improvements in purifying water."

This invention consists in employing, for the above purpose, hydrate of barytes. "It is to be mixed with water which " is contaminated with sulphates or carbonates of lime or " magnesia, or other impurities in order to decompose and

“separate the same from the water. The water may be afterwards filtered or the impurities allowed to subside before use,”

[Printed, 4d. No Drawings.]

A.D. 1853, October 18.—No. 2400.

D'AZENE, CHARLES PEYNAUD.—(*Letters Patent void for want of Final Specification.*)—“Improvements in the method of rendering sea-water fit for drinking and all other purposes where fresh water is ordinarily used.”

The water is filtered through a mixture composed as follows:—Animal charcoal 3 parts, tallow 3 parts, lime 8 parts, sulphate of iron 4 parts, sulphuric acid 3 parts, fresh water 16 parts.

“The filter I use for the purpose is composed of two inner stones, so as to secure a double filtration, but the ordinary filter may be used.”

“Before commencing the filtration of the sea-water I wet the inside of the upper compartment of the filter by means of a brush or any other article with the mixture as above prepared, and I then steep the sponges of the filter in the same mixture until they have imbibed all they will take up, after which I place them in their proper places in the filter, whereupon it is ready for use. The sea water is then put into the filter, and passes through in the ordinary way.”

[Printed, 4d. No Drawings.]

A.D. 1853, December 5.—No. 2820.

CHEAVIN, SQUIER.—“A double-action or belt-filterer.”

“Within the outer vessel” “are two or more perforated bottoms” “resting upon rims or rests fixed to such outer vessel; also a cylinder of such a size as to admit of layers of gravel, charcoal, and other filtering substances being put all round between it and the sides of the outer vessel. The sides of this cylinder are perforated in order that the water may pass into and through such layers of gravel or other filtering medium.” “At the top or in the interior of the cylinder may be placed a sponge or bag of felt” “through which the water may pass before passing through the holes of the cylinder into the layers of the gravel or other filtering

“medium.” “Between the two perforated plates above referred to are placed layers of gravel and other filtering substances, through which the water after filtration through the filtering medium around the cylinder descends into a receptacle for the same (which I designate the receiver) at the bottom of the outer vessel, from whence it may be drawn off by a tap or any other means; a communication with this receiver for cleansing or any other purpose is afforded by a hole at the bottom of the outer vessel, which may be stopped by a bung or any other means which may be preferred. An air tube in connection with the top of the mouth or bowl of the cylinder is attached to the outer vessel, and being portable may be removed at pleasure.”

[Printed, 6d. Drawing.]

A.D. 1853, December 21.—No. 2970.

DINNING, JAMES, and INGLIS, WILLIAM.—(*Provisional protection only.*)—“An improved apparatus for purifying and filtering residuous water.”

The object of this invention is the purifying water which has been used for the purposes of washing. The foul water is collected in a tank where it stands till the grosser impurities are deposited through the operation of a chemical agent. It then passes into a reservoir provided with a filtering apparatus composed of one or more tubes of fine wire gauze, thence it runs off through a filter pipe fitted with a sponge, and is stored in tanks for subsequent use.

[Printed, 4d. No Drawings.]

1854.

A.D. 1854, February 28.—No. 489.

WAY, JOHN THOMAS, and PAINE, JOHN MANWARING.—“An improvement in the manufacture of gas, and also of a charred product.”

“This invention consists of distilling a compound matter consisting of a stone or earth (largely composed of soluble silica, found in Surrey, and probably in other places), and

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“tar or fat or oil, or other organic matter, and thereby obtaining gas for the purposes of light and heat, and a charred product suitable for making filters, and for de-colorizing and deodorizing purposes.”

“The first part of the process consists in impregnating the earths or minerals before mentioned with blood, tar, or any other animal, vegetable, or organic substance, capable when strongly heated of yielding charcoal.” When coal tar is the liquid employed, the above-mentioned silica earth is dried, broken into pieces, and impregnated with tar; the impregnation may be effected by boiling the tar with the fragments of rock in it, or by mixing the silica rock, in coarse powder, with the tar, by a pugging machine, into a thick paste.

The second part of the process “consists in exposing the silica rock saturated with tar or other liquid, as described, to a high temperature, in order that inflammable gases may be produced, and that charcoal may be deposited in the pores of the silica rock.” This operation is conducted in ordinary gas retorts; when drawing the charge of the silica charcoal it is exposed for as short a time as possible whilst red hot to the air, for this reason it is either cooled rapidly in water or received in iron boxes with close covers.

[Printed, 4d. No Drawings.]

A.D. 1854, March 6.—No. 540.

SICARD, PIERRE AMABLE DE SAINT SIMON.—“Improvements in purifying sea and other water.”

“The object of this invention is to cause sea or other water to be evaporated at so low a temperature that the organic impurities shall not be decomposed by the heat. For this purpose the water is caused to filter through stone or other suitable filters into a vessel which is rendered vacuous, such vessel being constructed with a view to offer as much extent of surface in contact with water as possible, in order to obtain as much cooling or condensing surface as may be, and this may be aided by an injection of cold pure water. In order to obtain the requisite heating and filtering apparatus, although the form may be varied, it is preferred to employ hollow cylindrical filters to admit of the heating apparatus being within them, yet leaving a space between

“ the interior of the filters and the exterior of the heating apparatus, which are made of corresponding forms, and so as to be placed interior of the filters. By these means the sea or other water to be purified will, by reason of the vacuum within the apparatus, be constantly pressed by the outer atmosphere through the filter or filters, and thence into the vacuous vessel; the water meeting with heat as it comes through the filter or filters becomes vaporized at a very low temperature, by reason of the vacuum, and the vapour will be condensed by means of the cooling surfaces of the vacuous vessel, or by passing from that vessel to another.”

The water is supplied through pipes that pass through the vacuous vessel to the chamber containing the filter, and through the filter to the heated chamber in connection with the vacuous vessel where the steam is condensed; the supply pipes act as a means of condensing the steam in the vacuous vessel.

[Printed, 6d. Drawing.]

A.D. 1854, March 18.—No. 648.

DANTEC, WILLIAM.—“Improvements in purifying water.”

These improvements relate to water containing earthy salts in solution, and the invention consists in causing the precipitation of these impurities by adding hydrate of barytes to the water containing them. The water is allowed to stand till it becomes clear, and, if considered desirable, may then be filtered.

The Provisional Specification mentions hydrate of strontia as well as hydrate of barytes to precipitate the impurities set forth above.

[Printed, 4d. No Drawings.]

A.D. 1854, April 27.—No. 953.

OWEN, THOMAS GRIFFITH.—(*Letters Patent void for want of Final Specification.*)—“An improved construction of portable filter.”

The object of this invention is the filtering of water used by soldiers when in the field. This is attained by manufacturing the ordinary cavalry bucket of gutta percha, and dividing it into three compartments by means of two horizontal partitions.

“ The middle space I fill with tale and powdered charcoal, or
“ other suitable filtering medium, and allow the water from
“ the upper compartment to enter this compartment through
“ a central opening in the upper partition.

“ Openings are made in the lower partition to allow the
“ water as it permeates through the porous bed to fall into the
“ lower compartment, whence it may be drawn off by a tap.”

[Printed, 4d. No Drawings.]

A.D. 1854, August 18.—No. 1818.

MATHIEU, FRANÇOIS.—(*Provisional protection only.*)—

“ Improvements in filters.”

“ The positive filtering medium is made up of diaphragms of
“ felt, or other material of a like kind, with interposed layers
“ of charcoal or carbonaceous matter.

“ When intended for filtering by ascension, depositing the
“ apparatus in a primary receiving reservoir or cistern, the
“ filter takes the form of a necked vase or bottle.” “ The
“ bottom portion of this chamber is perforated to admit
“ the water or liquid to be filtered, and this perforated dia-
“ phragm is covered over with a diaphragm or divisional piece
“ of felt. This felt diaphragm is cupped or turned up all
“ round its periphery, so as to bear well and closely against
“ the interior surface of the chamber.” “ Such a felt dia-
“ phragm forms a species of shallow saucer, and its recess is
“ filled up with a layer of chracoal. This forms the complete
“ compound filtering diaphragm, which is repeated to any
“ extent towards the top of the chamber.”

“ The neck at the top of the chamber has attached to it
“ a flexible or other tube to conduct the filtered liquid away
“ for use.”

A pendant filter may be made on the principles set forth above.

[Printed, 4d. No Drawings.]

A.D. 1854, September 18.—No. 2018.

LEWIS, THOMAS, and BARTLE, ABRAHAM.—(*Provisional protection only.*)—“ Improvements in apparatus for purifying
“ water.”

“ Our invention consists of improvements in apparatus for
“ the purpose of evaporating sea and other impure water, by

“ converting it into steam, & condensing that steam in such manner as to produce a perfectly tasteless and pure water. We employ a boiler with a furnace underneath, a pipe to supply the impure water, and a steam pipe to carry off the vapour to the condenser, which is a cylinder, provided with proper stop-cocks, &c. The steam pipe terminates in a coiled pipe passing through this cylinder, the cylinder being kept charged with cold water, which by means of an ingress and egress pipe is kept constantly running. The condensed steam passing through the coil, constantly surrounded with cold water, runs off at the end of the coil in a state perfectly fit for use.”

[Printed, 4d. No Drawings.]

1855.

A.D. 1855, January 13.—No. 92.

BRITTEN, JOHN. — (*Provisional protection only.*)—“An improvement or improvements in the means of filtering liquids.”

The invention consists in employing, for the purpose of hastening filtration, the atmospheric pressure produced by a column of the liquid being filtered. One method consists in using a long pipe or tube to an ordinary funnel. “The said tube is closed at bottom until it is filled with the filtered liquor, when it is opened (its end being immersed in the liquor in the receiving vessel.) The filtration then goes on under pressure, the amount of which depends upon the length of the tube, and may be varied at pleasure.”

[Printed, 4d. Drawing.]

A.D. 1855, January 22.—No. 163.

TROTMAN, SANDERS. — (*Provisional protection only.*)—“Improvements in filtering apparatus.”

The object of this invention is to make a filter self-cleansing. “For this purpose” “I cause the liquid to enter the filtering

“ apparatus through passages furnished with a slide valve or
 “ cock, by means of which the direction of the flow of liquid,
 “ and consequently the filtering surfaces, can be instantly
 “ neously reversed, whereby a cleansing action is at once pro-
 “ duced. The exhausting pump may also be made to return
 “ a portion of the liquid back through the filtering medium at
 “ every stroke, thereby effectually cleansing the same, and
 “ counteracting all tendency to choke.”

[Printed, 4d. No Drawings.]

A.D. 1855, January 30.—No. 228.

BROOMAN, RICHARD ARCHIBALD.—(*A communication.*)—
 (*Provisional protection only.*)—“An improved filter.”

This filter consists of a layer or layers of cotton fibre, or cotton waste, or other vegetable and animal fibres placed between perforated plates or other suitable contrivances for confining the fibrous material. When the fibres become too much charged with matters left therein they may be cleansed by water or steam.

[Printed 4d. No Drawings.]

A.D. 1855, May 29.—No. 1229.

LEE, THOMAS VINCENT.—“Improvements in generating steam
 “ in marine and other boilers.”

The objects of the invention are, first, the reduction of the quantity of fuel to generate steam in marine and other boilers, second, “the removal of saline and earthly matters from sea
 “ water.”

The last-mentioned purpose of the invention is that which is cognizable in the present series of Abridgments. The small boiler used to generate steam (which is afterwards “surcharged” for heating a larger boiler) is in connection with a small chamber called an “insulator.” The steam having been produced in the small boiler is passed into the insulator, which “is made in
 “ two parts, the under or lower portion thereof being charged
 “ with pumice stone, and which will require to be occasionally
 “ cleaned and changed. By passing through the insulator so
 “ charged as last-foresaid, the steam is deprived of all saline
 “ and earthly properties.”

If there be too great a supply of steam from the small boiler at any time, a double valve enables it to be turned off into a refrigerator, whence is obtained fresh water. "This portion " can be worked any time fresh water may be required, either " with or without the working boiler."

[Printed, 10d. Drawing.]

A.D. 1855, June 4.—No. 1271.

GRAVELEY, WILLIAM HENRY.—(*Letters Patent void for want of Final Specification.*)—"An improved apparatus for " cooking purposes, and improvements for the production of " fresh water for ship and land use."

This invention consists " firstly, in arranging and erecting an " apparatus for the purpose of cooking, which is especially " adapted for ship use, and in such manner as to economise " by distributing more effectually the given amount of heat " obtained by the combustion of fuel to the various cooking " parts thereof, and in constructing the said cooking apparatus " in such manner as to provide when necessary, a given amount " of heated atmospheric air or steam, for the purpose as herein " given as the second part of my invention, which is as " follows :—

" In the production of fresh water for ship and land use, by " means of an improved distilling apparatus, arranged so as to " combine the advantages of distillation and cooking by the " one operation or seperately when required, and so constructed " as to provide a much greater quantity of wholesome fresh " water than can be obtained by the ordinary methods of distillation. For the above purpose, I use any description of " salt or sea water, or other solutions from which fresh pure " water can be extracted, and by means of steam or heated air, " so regulated and supplied from the first part of my invention " (as herein given), or from any other convenient source, as " to cause the same to evaporate into proper receptacles under " a low pressure of atmosphere, by which means I am enabled " to condense more rapidly a pure aeriform vapour into whole- " some fresh water for all purposes for which it may be " required."

[Printed, 4d. No Drawings.]

A.D. 1855, July 19.—No. 1636.

BROADBENT, THOMAS, junior.—(*Provisional protection only.*)—"Improved apparatus for filtering liquids."

"The cistern which receives the supply of water I divide by
" a vertical partition into two compartments, and in the lower
" part of this partition I form a water way, which I fill with
" sponge or other suitable porous substance. In front of this
" water way, on the supply side of the cistern, I fit a filter
" box, which I fill with sand, charcoal dust, or other porous
" or granular substance, and cover with a perforated lid, com-
" posed of two pierced metal plates, or of two pierced boards
" fastened together with a layer of sponge between. Standing
" up from this lid is an air tube, for conducting off any air
" that may enter the filter. On the other side of the vertical
" partition, or the discharge side of the cistern, is a second
" filter, which communicates with the first filter through the
" opening in the partition. The water, when it enters the
" supply side of the [cistern, passes by gravity through the
" perforated lid of the first filter, and penetrates through the
" filtering bed of sand or charcoal; it then passes through
" the sponge fitted into the orifice in the partition, and enters
" the second division of the cistern, forcing its way upwards
" through the sand or charcoal bed in the second filter, and
" makes its exit therefrom in a limpid state."

[Printed, 4d. No Drawings.]

A.D. 1855, September 27.—No. 2154.

ATKINSON, MATTHEW, and RIDGE, BENJAMIN.—"Improve-
" ments in the construction and setting of steam boilers for
" economizing fuel, and for rendering the same, applicable
" not only to the generation of steam, but also to ventilation,
" and distillation of water for ships' use, and the distribution
" of heat for general purposes."

The boiler has a hollow bed plate that carries a circular fire grate, capable of oscillating, for discharging the contents on the said bed plate. A conical-shaped hollow vessel, having an annular water space therein, encompasses the fire grate; the chimney of the fire proceeds through the top of the vessel,

and through a steam chest above it. To the under side of the above steam chest is attached "a double case or cylinder of metal, which encompasses the before-mentioned inner conical-shaped vessel, leaving an annular space or chamber between the two vessels, and corresponding with an opening formed in the base plate, for the admission of air to the furnace to support combustion of the fuel. The aforesaid inner and outer vessels are connected together near the bottom thereof by four or more pipes placed horizontally and the upper part of the outer case or double cylinder is connected to the steam chest by suitable holes formed in the bottom of said chest, and the top of the double cylinder case, by which, when the said vessels are charged with water and heat is imparted thereto, the water is enabled to circulate freely through the same." Auxiliary coils of pipes may be placed in the space between the inner and outer vessels. Each coil has its upper end fixed to the under side of the steam chest and its lower end to the outer casing of the inner double conical vessel. A damper regulates the velocity of the air between the interior and exterior casings of the boiler.

[Printed, 10d. Drawing.]

A.D. 1855, October 15.—No. 2303.

KENT, SAMUEL.—(*Letters Patent void for want of Final Specification.*)—"Improvements in purifying and measuring water, parts of which are applicable to measuring other fluids."

"This invention consists in a novel arrangement of apparatus for filtering the water in its passage" from the roofs of houses and other elevated situations to the tank or cistern, where it is collected for domestic or other uses, and for registering the amount drawn therefrom. Also in the combinations and arrangement of materials used to form the filtering beds, and in the use of a powdered compound "for the purpose of softening the water when required."

On a perforated stage, elevated some distance from the bottom of the filtering chamber, is laid a layer of pebbles, then fragments of granite, a piece of hair cloth and a bed of ground glass, which is covered with another piece of hair cloth, upon which is laid a terro-metallic bed. The said terro-metallic bed

contains flint, steel filings, oxalate of ammonia, peroxide of manganese, animal charcoal and boxwood charcoal. Above this upper stratum is laid another covering of hair cloth and a perforated stage "which forms the floor of the compartment "into which the filtered water percolates." The water percolates upward through the strata. By an arrangement of valve and floats, the waste water is made to carry away sediment.

The softening of hard water is accomplished by means of a powder containing oxalate of ammonia, peroxide of manganese and charcoal. This mixture is placed in the space below the filtering beds.

[Printed, 4d. No Drawings.]

A.D. 1855, December 5.—No. 2735.

FELL, THOMAS MARA.—"An improved ship's cooking and "distilling apparatus, and improvements for the production of "fresh water from sea or salt water."

One apparatus combines the processes of cooking and distilling. In addition to the cooking arrangements, there is "a contrivance of heated flues, evaporating and condensing "chambers, whereby the heat produced by the combustion "of fuel is communicated direct to the ship's ovens or pots, or "immediately to the distilling portion of the apparatus."

A second apparatus produces "fresh water from salt or sea "water without the said cooking appliances, but having the "same essential means of distillation and condensation upon a "more extended scale, with provisions and connexions for "receiving a supply of heated atmospheric air or steam from "the ship's boiler or fire hearth; or, when used for land "purposes, or found necessary, to be capable of generating "sufficient steam for the production of fresh water."

In these apparatus a series of boilers are heated by a continuous flue passing through the same. The supply of sea water to the boiler is regulated by a valve, attached, by means of a double crank and stuffing boxes, to a float or ball moving in a small chamber. The supply of salt water to the condenser is regulated by a valve, and pipes are suitably arranged for the exit of the concentrated sea water. The salt water from the sea *first enters a helical pipe at the lower part of the first or hot*

condenser, it then traverses the series of boilers, from the uppermost to the lowest, and exits as concentrated sea water. The steam from the boilers passes into the hot condenser, thence into a spiral tube cold condenser, from which it issues, as water, by a suitable exit pipe.

[Printed, 10d. Drawings.]

1856.

A.D. 1856, March 26.—No. 718.

TOLHAUSEN, ALEXANDRE.—(*A communication from Halvor Halvorsen.*) — “An improved mode of manufacturing “porous earthenware.”

The said porous earthenware is made “of different degrees “of porosity for various purposes, such as filters for water, “cells for galvanic batteries, etc.”

The nature of this invention “consists in the use of a volatile salt or substance mixed with plastic clay, or such like “substance, which is to form the porous ware, the said volatile “salt or substance to be driven off in the act of baking the “prepared clay or material, thereby leaving it porous according to the amount of volatile salt or substances used in the “clay, thus forming porous earthenware.”

Some volatile salt or substance is mixed with “any of the “well-known clays or earthy substances employed for making “earthenware,” while the said clays are in a plastic state. The ware is then moulded in common moulds, and baked in the ordinary way for making unglazed earthenware. “In the “act of baking or burning the mass, all the volatile salts or “substances are driven off, leaving the earthy base or ware “thus produced of a porous character.”

Amongst the volatile salts or substances mentioned, are, oxide of mercury, arsenic acid, sulphur, and resin.

[Printed 4d. No Drawings.]

A.D. 1856, April 22.—No. 966.

BLACKWELL, THOMAS EVANS. — (*Provisional protection only.*)—"An improvement in treating water for the use of "brewers."

For this purpose, water which is soft, or comparatively soft, "is caused to be filtered through beds or filters composed of "carbonate and sulphate of lime, the action being aided by "the use of carbonic acid gas, such materials being used in "combination with other filtering media to separate mechanically mixed impurities from the water."

[Printed, 4d. No Drawings.]

A.D. 1856, May 2.—No. 1044.

GORDON, ALEXANDER. — "Improvements in evaporating, "boiling, and distilling fluids, and generating steam."

This invention consists of a certain catadioptric apparatus "when it is used for the purposes of a thermoheliostat," also of a "combination of reflectors or refractors of the sun's heat, "with suitable provision to correspond with the motion of "the sun, whether diurnal or equinoctial, and whether it be "for continuous use only during a part of the day, or during "the whole day."

The said thermoheliostat is made to collect the sun's heat rays and to continuously direct them upon the distilling vessel (in the case of distilling sea water for example), suitable motion being imparted to the apparatus to enable the heat to be concentrated upon the still.

The still is suspended from a crane, so as to be in the focus of the reflector; by this means "fresh water is distilled "off from the salt water, and when filtered through charcoal "it becomes fit for drinking." Sometimes the still is supported on a frame. A falling weight may be made to impart the requisite motion to the reflector. A plan of arranging reflectors that will only require equatorial motion is shown; two parabolic reflectors, with a lower spherical reflector are employed.

The refracting apparatus preferred is Fresnel's; these polygonal lenses both reflect and refract the rays. This apparatus is said to require no diurnal motion.

[Printed, 10d. Drawing.]

A.D. 1856, May 26.—No. 1250.

DE BUFFON, BENJAMIN NADAULT.—“A new apparatus for
“clarifying and purifying water and other liquids.”

The special feature of this filter is that, in it, the liquid to be filtered passes from the outside to the inside of the apparatus. The apparatus is composed 1st, of a sheet metal tube perforated; 2nd, of an outer casing of metallic gauze; 3rd, of filtering materials arranged and compressed in the space between the two cylinders; 4th, of annular wooden or metallic discs placed at each extremity of the cylinder for compressing by means of a screw press the filtering materials in the direction of the longitudinal axis of the tube; 5th, of an outer casing; 6th, of a small air tube placed at one end of the inner tube to insure the continuity of the current.

“At one end of the filtering cylinder the extremity of the
“inner tube is lengthened, and is terminated by a screw joint
“of the ordinary form, which is adapted to a flexible tube of
“suitable length to distribute the product either to a larger
“conduit or to a reservoir conveniently situated, from which
“the purified water is withdrawn either by means of a pump
“or by any other apparatus.”

The filtering materials consist, “first of sponge, moss
“chopped and mineralised, mixed at option with variable
“proportions of pulverulent matters, such as charcoal, cinders,
“&c.; secondly, woollen stuff, clippings, felt, and other
“waste; thirdly, siliceous sands from quarries, or sand stone,
“animal or vegetable charcoal in powder, cinders, &c.”

[Printed, 10d. Drawing.]

A.D. 1856, May 26.—No. 1252.

DE NORMANDY, ALPHONSE RENÉ LE MIRE.—“Improvements
“in obtaining fresh water from salt water.”

A process of double distillation, whereby aerated and non-aerated fresh water are produced, is described.

The apparatus “consists essentially of four parts:—1st, the
“evaporator; 2ndly, the condenser; 3rdly, the priming box;
“4thly, a refrigerator; which four principal parts are se-
“curely bolted and fastened together;” they are connected
with four other accessory parts, namely, “5thly, differential
“or equilibrium valve for regulating the pressure of steam;”

“ 6th, a water regulator; 7th, a steam trap; and 8thly, a “ filter.”

The filter is connected with the exit pipes of the refrigerator. The water runs into the filter in the state of cold aerated fresh water, and, in the said filter, it mixes with non-aerated water, “ so that the fresh water which runs out of the filter is a water “ generally containing at least a mean quantity of air.” The filter itself is charged with animal charcoal, which description of charcoal the inventor has discovered “ has the property of “ completely removing the unpleasant odour and taste of “ distilled water, provided that water contains air or is mixed “ with air.” “ Animal charcoal is much to be preferred to “ vegetable charcoal for the purpose, the later, contrary to “ what would have been expected, having scarcely any effect “ upon the disagreeable taste and odour of distilled water. “ Such animal charcoal will remain good for a considerable “ time.”

[Printed, 1s. 2d. Drawings.]

A.D. 1856, June 25.—No. 1490.

BUFF, HENRICH LUDWIG, and VERSMANN, FREDERIC.—

“ An improvement in purifying and softening water.”

This invention consists “ in applying silicate of soda in combination with carbonate of soda or other matters known to “ precipitate lime. For which purpose the silicate of soda, “ with the other precipitating agent, is to be introduced into “ the water and agitated. The water is then allowed to settle “ for some time and if desired filtered.”

As a preliminary process, the hardness of the water must be ascertained by Clarke's process, also the quantity of magnesia which the water contains. Certain proportions, thus determined, of carbonate of soda and of silicate of soda are then added to the water, and the precipitation and filtration above-mentioned subsequently takes place.

[Printed, 4d. No Drawings.]

A.D. 1856, July 12.—No. 1649.

PETRIE, WILLIAM.—“ A new porous material for filters and

“ other like articles, and for certain modifications or improvements in the manufacture of the material, whereby it is

“ adapted to the formation of vessels of capacity, to be employed as a cement, as a water and acid-proof lining as a preservative coating, and as a substitute for stone and earthenware.”

This invention relates to, 1st, the formation of porous material from a composition of sulphur, with grains of other suitable matter; 2nd, the casting of these porous materials “with a tail,” the casting of them in, and the employment of, perforated moulds; 3rd, “the formation of articles, such as vessels, pipes, tiles, blocks, slabs, and ornaments, by casting or pressing into moulds a composition of sulphur with grains of other matter, porous or not;” 4th, the casting the non-porous composition “with a head;” 5th, the improvement of that composition by the intermixture of all sized grains of material; 6th, the employment of compound sulphur, in combination with grains of other material, to form a composition; 7th, the employment of compound sulphur alone to form non-porous articles; and 8th, “the employment of any and all of these improved compositions of sulphur as a cement” for hydraulic works and other building purposes.”

[Printed, 4d. No Drawings.]

A.D. 1856, August 4.—No. 1834.

CADIAT, NICOLAS.—“The application of centrifugal force for purifying liquids.”

“This invention consists in applying a centrifugal apparatus for purifying liquids, and more especially water. The apparatus may be either *simple* the operation being produced solely by a centrifugal action; or it may be combined with straining substances, the operation being then performed by such combined action; in the latter case the liquid is at once submitted to the centrifugal action, and forced through suitable straining or filtering substances.”

The apparatus consists of an upper reservoir containing the liquid to be purified, a feed pipe, a rotating purifying chamber with a central upright tubular shaft, and an exit pipe. The chamber rotates on a vertical axis, and is conical in vertical section, having the widest part of the cone downwards.

The liquid is conveyed from the upper reservoir, through the feed pipe, to a receiving chamber or inverted cistern below the rotating chamber. Thence it enters the rotating chamber

where the muddy or impure particles are forced to collect in its lowest and widest part, whilst the pure water ascends through the central upright tubular shaft into a cistern or box connected with the exit pipe.

The inverted cistern "feeds the purifying apparatus, but its chief object is to relieve the pivot of the heavy weight of the purifying chamber and the liquid it contains. The liquid is enclosed within it, exerting a pressure under the purifier, which balancing the weight of the purifier, prevents the friction of the pivot upon its bearing." The rotating chamber is divided into an upper and a lower portion by diaphragms which act as a filter.

In a modified apparatus, the feed pipe surrounds the central upright shaft, and the rotating chamber is double and cylindrical. The inner and perforated cylindrical surface may be surrounded with a metallic cloth, and the latter with a filtering material.

In a conical apparatus with a central feed pipe, the filtering chamber is divided into compartments by vertical radiating partitions.

[Printed, 1s. 6d. Drawings.]

A.D. 1856, September 19.—No. 2196.

VASSEROT, CHARLES FRÉDÉRIC.—(*A communication from Henri Darcy.*)—"Improvements in filtering water on a large scale."

These improvements relate to an apparatus, at the bottom of which are two filtering beds, the upper one being composed of fine sand, the lower one of gravel. The gravel bed has "for its base a kind of skimmer made of thick boards or of iron perforated with a great number of small holes. These thick boards or iron are supported by iron circular bands placed around the bottom of the apparatus. The inside" is made slightly concave, and in the centre is placed the pipe "which receives the filtered water to convey it to the reservoir, or otherwise. The feeding of the apparatus may be accomplished by a pipe which pours the water into it about a yard above the filter."

"For emptying the apparatus to the level of the filter, four or more horizontal orifices shall be disposed at the distance of half a radius from the centre, being the mouths

“ of 4 pipes,” “ which passing through the apparatus shall be
“ adjusted to a circular pipe ” “ closed by a cock.”

The drawings show a process of filtering by augmenting the head of water upon the filter. The mud above the filter may be kept in suspension by directing the current of water tangentially upon the filter. Another means of keeping the mud in suspension is by imparting a rotary motion to a broom. By opening a cock in connection with the circular pipe, the water containing the muddy deposit is discharged. Instead of using a head of water, the filter may be caused to act by diminishing the pressure under the filter.

[Printed, 8d. Drawing.]

A.D. 1856, October 22.—No. 2479.

LIEBMANN, CARL HEINRICH JULIUS WILHEM MAXIMILIAN.—
(*A communication.*)—(*Provisional protection only.*)—“ An
“ improvement in purifying water.”

This invention consists in applying carbonic acid gas and hydrate of lime to the purification of water. “ The water heated
“ with carbonic acid gas and hydrate of lime is allowed to flow
“ through an aperture at the side of the vessel above the layer
“ of lime, and after being agitated is subjected again to carbonic
“ acid gas, is then allowed to subside and drawn into a third
“ vessel, in which it is again subjected to carbonic acid gas,
“ the water so treated will be disinfected, purified, and rendered
“ fit for drinking.”

[Printed, 4d. No Drawings.]

A.D. 1856, November 15.—No. 2705.

DAVIES, GEORGE.—(*A communication from Jean Alphonse Pichot and Pierre Prosper Malapert.*)—“ An improved paper
“ suitable for the filtration of liquids, the dressing of wounds,
“ and for the manufacture of envelopes, bags, bands, and for
“ other similar purposes.”

“ A layer of pulp, of any color, having been ‘ laid ’ on the
“ wire cloth to form one face of the paper,” a piece of tissue
or woven or felted fabric, “ is laid thereon, and is then covered
“ with a second layer of pulp to form the other face of the
“ paper. This second pulp contains a mixture of powdered
“ vegetable or animal charcoal, added thereto at the time of

“ fabrication, and previously carefully washed with acids, in order to render it perfectly pure, that is to remove therefrom any foreign matter, more especially sulphurets.

“ The pulp employed for this purpose may be made either of hemp, flax, or other material, but for filtering purposes wool is preferred.”

“ When the paper is to be used for filters employed for the filtration of liquids more or less charged with fetid or solid matters, instead of the layer of charcoal pulp, discs or blocks of the same may be employed, of different thicknesses and dimensions, according to the form of the vessel and the purposes for which it may be employed.

“ In order to increase the clarifying properties of the filters, sand, clay, or minerals may be introduced therein. This additional mixture completes their chemical properties, and renders them eminently useful.”

[Printed, 4d. No Drawings.]

A.D. 1856, November 21.—No. 2756.

LIEBMANN, CARL HEINRICH JULIUS WILHEM MAXIMILIAN.—(*A communication.*)—(*Provisional protection only.*)—“ Improvements in the purification of water and in the preparation of materials employed therein.”

The improvements consist in employing carbonic acid for the purposes of purification. The water is impregnated with carbonic acid according to any of the usual methods. “ In so treating water with carbonic acid, I employ bicarbonate of sodium and oxalic acid in crystals, the vessel containing the water being about one-third full, and kept air-tight or well covered at the top.”

[Printed, 4d. No Drawings.]

A.D. 1856, December 3.—No. 2864.

GATTY, FREDERICK ALBERT.—“ Improvements in the construction of filters or drainers.”

These filters are made by preference of wood and of a square shape. The sides and bottoms are pierced with narrow slots. According as the substances to be filtered are thick or the reverse, will be the narrowness or wideness of these slots in the sides and bottoms. In certain cases, animal charcoal or other purifying substances may be inserted in the slots. My im-

“ proved filters, after being in operation, are easily cleaned,
 “ by passing a suitable instrument through the slots, to free
 “ them from any substances adhering thereto.”

[Printed, 4d. No Drawings.]

1857.

A.D. 1857, January 21.—No. 186.

MEDLOCK, HENRY.—“ An improved method of purifying
 “ water.”

“ I suspend in a tank or reservoir containing the water to be
 “ purified, by means of iron rods passing across it, iron wire
 “ of about one-sixteenth of an inch in diameter, loosely packed
 “ in bundles or coils, and in the proportion of about one pound
 “ weight of such wire to every one hundred gallons of water.
 “ I allow the water to remain in contact with the iron wire from
 “ twenty-four to forty-eight hours, according to the rapidity
 “ with which the precipitation of organic matter occasioned by
 “ such contact takes place, and I then pass the water through
 “ any kind of filtering medium now in use which is capable
 “ of retaining the precipitate formed. For the filtration of
 “ water in large bulk, I have found the ordinary sand filter
 “ sufficient.”

[Printed, 4d. No Drawings.]

A.D. 1857, February 10.—No. 396.

ROPES, HENRY TIBBETS, and THOMAS, DAVID WILSON.—
 (A communication.)—(Provisional protection only.)—“ Im-
 “ provements in the application of filters to cocks, taps, or
 “ other valves, and to draw off liquids.”

This invention consists in attaching to or forming on the dis-
 charge parts of the above apparatus a receptacle containing
 filtering materials. The liquid is filtered when passing through
 the cock, tap, or valve. This “ chamber or receptacle, or part
 “ thereof, it is proposed to screw on to the nose of the valve,
 “ so that it can be readily detached therefrom for the purpose
 “ of cleaning or removing the filtering medium.”

[Printed, 4d. No Drawings.]

A.D. 1857, March 9.—No. 686.

LIEBMANN, CARL HEINRICH JULIUS WILHEM MAXIMILIAN.
—(*A communication.*)—"Improvements in the purification
" of water and the preparation of materials requisite for the
" process."

This invention consists in purifying water by first agitating it, and if it contain carburetted or sulphuretted hydrogen gas, then impregnating it with one-tenth of its volume of carbonic acid gas. "Immediately after the impregnation with carbonic acid a quantity of hydrate of lime is added to the water, without regard to form in either powder, cream, or lime water. The quantity of hydrate of lime must be sufficient to precipitate all the free carbonic acid, the acid of the bicarbonates originally contained or formed in the water, and besides, to make the whole bulk of the latter strongly alkaline; much agitation must be carefully avoided while the lime is added."

"After adding the lime the water should remain without the slightest agitation for from 12 to 16 hours." "The water is then led off through a system of pipes, the mouths of which are just above the layer of the precipitate, to a second reservoir."

"The lime having been precipitated by carbonic acid, the water" "is then again transmitted through a system of pipes inserted over the layer of precipitate into a third receptacle. It is now fit for use."

[Printed, 6d. No Drawings.]

A.D. 1857, May 6.—No. 1277.

HOOD, WILLIAM.—"An improved charcoal filter, for rectifying and cleansing spirits, and which is also applicable for filtering water and other fluids."

To the bottom of an air-tight vessel is fitted a filterer, consisting of a perforated plate covered with leather or other suitable material, over which a layer of sand is placed. A quantity of charcoal is placed over the sand. The liquid to be filtered is pumped into the vessel, and is drawn off through taps at the bottom. After the vessel has been half filled with liquid, air is forced in, and thus the liquid is forced by the compressed air through the filtering bed or beds, and may be

drawn off in a pure state from the delivery tap. In the operation of the compressed air consists the novelty of this invention.

[Printed, 10d. Drawing.]

A.D. 1857, June 9.—No. 1616.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—(*Provisional protection only.*)—"An improved construction of "faucet or cock."

This improvement relates to filtering the water, if desired, while passing through the cock. The body or shell "is formed "of a chamber, having a curved pipe attached to its upper "end, which pipe is provided with a cock or valve, while the "lower end of the chamber has attached to it a pipe, which is "provided with a cock or valve for closing the same when "required. Within the chamber, at about its centre, there is "placed a ring, having bars fitted within it. The upper surfaces of these bars are knife-edged, and they branch or "radiate from one side of the ring." "The lower edges of "the bars are longitudinally of convex form, the upper edges "being horizontal." "Filtering material is placed upon the "bars and ring, and a perforated metal plate is placed upon "it, and is kept in proper position by the lower edges of a cap "piece, which forms the upper part of the chamber. The "filtering material, ring, and bars, and the perforated plate "divide the chamber into two compartments." "When the "lower cock or valve is closed and the upper cock is open, "the water being under pressure will pass into the lower "compartment up through the filtering material and out "through the top pipe; but when the cock on this pipe is "closed and the cock on the lower pipe is open, the water "will pass out through the latter. In the former case the "water will of course be filtered, but in the latter case it will "not."

"The filtering material is kept clean by means of the bars, "which direct the water from the supply pipe over the whole "under surface of the filtering material, and by closing the "cock in the upper pipe and opening the cock of the lower "one, the water, as before stated, will escape through the "lower pipe, thereby thoroughly cleansing the under surface "of the filtering material."

[Printed, 4d. No Drawings.]

A.D. 1857, June 19.—No. 1713.

SPENCER, THOMAS.—“Improvements in the purification of
“ water and other fluid and gaseous bodies.”

The first part of this invention relates to removing “organic
“ color or deleterious gaseous body from water,” and consists
in employing an oxide of iron either independently or else in
combination with sand, gravel, or other substances, and causing
the water to pass through a layer of the composition. The
second part relates to applying the same process to the purifi-
cation of alcoholic fluids. A claim is made not only for purify-
ing water and other fluids by means of the ferruginous oxide,
either alone or in combination with any other filtering media,
but also for “the same oxide for these purposes as found com-
“ bined in the mineral or artificial substances” named in the
Specification.

[Printed, 6d. No Drawings.]

A.D. 1857, July 2.—No. 1840.

MALARD, AUGUSTUS PHILIBERT.—“Improvements in filtering
“ water and other liquids.”

This invention consists in causing the water to be filtered to
pass through layers of wool shearings which have been pre-
pared by immersion in baths composed as follows:—Ac-
cording to the Provisional Specification: “The first bath
“ is composed of one and three-quarter pints of lime water,
“ nine ounces (avoir.) of carbonate of soda, and fifty-two
“ pints of water. The second bath of about nine ounces of
“ alum, one and a quarter ounces of cream of tartar, and
“ twenty-one pints of water. The third bath of about seven
“ ounces bruised gall nuts, and seventeen pints of boiling
“ water. The fourth bath of four ounces of acetate or sul-
“ phate of iron, and seventeen pints of boiling water. The
“ last bath is formed of nine ounces of carbonate of soda
“ dissolved in forty-four pints of tepid water.”

According to the Final Specification: “Bath No. 1 consists
“ of lime water, about one and three-quarter pints, carbonate
“ of soda about eight ounces (apoth.), water about five to
“ seven gallons. The temperature of the bath should be
“ raised from one hundred and twenty-two degrees to
“ one hundred and forty degrees Fahrenheit, and the

“ wool left in the bath five or six hours. Bath No. 2 consists of alum about eight ounces (apoth.), cream of tartar about one ounce, water twenty-two pints. The wool is put into boiling water during about five hours, then exposed to the air during several hours, and afterwards boiled two hours with about six and a half ounces (apoth.) of powdered gall nuts and about seventeen pints of boiling water. Bath No. 3.—I then place the wool in a boiling bath, composed of about four ounces (apoth.) of acetate of iron and seventeen pints of water; or instead thereof I use the following:—Sulphate of iron about eight ounces (apoth.), and seventeen pints of water. The operation of the gall nut bath and iron bath should be repeated twice. I allow the wool to remain during several hours in the second bath; it should then be dried and submitted to a bath composed as follows:—Carbonate of soda about eight ounces (apoth.), tepid water about five and a half gallons, and left in it about half an hour.”

The filter shown in the drawings consists of a cylindrical case with a cover. The water to be filtered enters at the upper part of the case, and the exit pipe for the filtered water is at the lower part thereof. The layers of prepared wool are separated by sheets of wire gauze, and the whole rests upon a false bottom of wood or metal, perforated with holes; “pressure is applied to the filtering material by means of a screw.”

[Printed, 6*l*. Drawing.]

A.D. 1857, July 3.—No. 1858.

FORDRED, JOHN. —(*Provisional protection only*).—“Improvements in treating and purifying water.”

This invention consists in purifying, sweetening, and decolorizing water “effectually and cheaply by the use of carbonate of lime and sulphate of lime, both natural and artificial. Either of these may be applied by itself, or the two may be combined and mixed with the water and then allowed to subside, or they may be used as filtering media singly or combined, alone or in addition to the substances usually employed for that purpose.”

[Printed, 4*l*. No Drawings.]

A.D. 1857, July 31.—No. 2088.

GARNHAM, WILLIAM. —(*Provisional protection only.*) —
“Improvements in pumping apparatus.”

These consist in applying apparatus to the lower end of a pump barrel for the purpose of preventing the entrance of whatever might choke it, and at the same time of filtering the water. For these objects two boxes are used, one being placed within the other, and both perforated with holes. The space between them is filled with straw, cocoa-nut fibre, hair, or other fibrous material. The rising main from the pump is inserted in the inner box so as to draw the water through the filtering medium.

[Printed, 4d. No Drawings.]

A.D. 1857, September 5.—No. 2322.

JOHNSON, RICHARD. — “Improvements in purifying and
“filtering water.”

“The water to be purified” “is to be exposed to the influence
“and chemical action of the air, which is effected by causing
“the water to pass through the atmosphere for some distance
“in a small quantity, such as jets, sheets, or streams, and to
“fall upon a layer of broken slate, stone, or other suitable
“material. The water is thus brought into contact with the
“oxygen of the atmosphere, which will cause the mineral
“particles that are held in solution by carbonic gas to be
“separated and be precipitated upon the slate, &c., which
“forms the first bed or filtering layer, the water thus treated,
“and having passed through the filtering beds, will be perfectly purified and free from all vegetable, mineral, and
“other extraneous matters.”

In one of the filters shown, the water is forced through a jet, and thus expanded by means of water pressure, but air pressure or other equivalent force may be used. In another apparatus a Barker's mill arrangement spreads the water. In a third arrangement, applicable to domestic purposes, the water drops from a chamber containing cinders, &c., and is dashed upon the slate dish of the filter.

[Printed, 6d. Drawing.]

A.D. 1857, November 7.—No. 2822.

FORDRED, JOHN.—“Improvements in treating and purifying “ water.”

These improvements consist of forming filtering beds “of “ carbonate of lime and sulphate of lime (both natural and “ artificial), coke, burnt clay, wood charcoal, and pumice-stone.”

“If it be desired to harden the water so as to prevent its “ action on lead, I introduce into the filter bed a layer of “ granular sulphate of lime or gypsum.” To produce artificially a good hard water for brewing and dyeing purposes, the water is caused to pass through layers of granular gypsum and granular limestone; granulated marble may be substituted for the limestone. Distilled sea water is rendered potable by being filtered through a layer of granular limestone or marble and a thin stratum of granular gypsum, on the top of which is animal, wood, or peat charcoal, “the proportions being “ about twelve of charcoal, one of gypsum, and twenty-two of “ limestone or marble.”

When a tinged water for the supply of towns has to be filtered, railway coke is laid upon a bed of pebbles. The water may be allowed to ascend through a bed of coke, and to descend through sand, and thus to become cleansed.

[Printed, 4d. No Drawings.]

A.D. 1857, December 21.—No. 3137.

DE NORMANDY, ALPHONSE RENÉ LE MIRE.—“Improvements “ in apparatus used for distilling sea water on board ships and “ vessels.”

Heretofore, in these apparatus, it has been usual to employ pipes below the line of flotation of the ship to obtain the requisite flow of water to and from the condensers. According to the present invention, the distilling apparatus is combined with a steam engine and pump suitable for obtaining and discharging the condensing water into the sea above the water line of the ship or vessel. The steam for supplying the steam engine may be derived from the boiler that supplies the distilling apparatus, “and the steam passing from the steam “ engine may be conducted into the distilling apparatus to “ be condensed with that supplied to the refrigerator of the “ distilling apparatus.”

The sea water supply may be utilised in the boiler and evaporator as well as in the condensing and refrigerating apparatus. "On board steam boats or vessels the steam requisite for being condensed and for working the small steam engine may be supplied from one of the boilers which work the steam engines used for propelling the vessel; or a separate small steam boiler may in such case, as well as on board sailing vessels, be used for supplying the distilling apparatus and for working the small steam engine which supplies the requisite condensing water to the refrigerating or condensing apparatus."

[Printed, 4d. No Drawings.]

1858.

A.D. 1858, January 16.—No. 79.

ROSA, EDWARD,—(*Provisional protection only.*)—"Improvements in the manufacture of dough and other plastic or porous substances."

This invention relates to the raising of dough, "so as to produce the necessary spongy or cellular condition in the treated material without the aid of the usual or other process of fermentation by the combination of common air, carbonic acid gas, oxygen, nitrogen, hydrogen, or other gases with the wheaten or other flour and water."

In a strong metal vessel is a secondary open top chamber supported clear of the external chamber by feet, and having within it a mixer actuated by a vertical shaft that passes into the interior through a stuffing box. The internal chamber is partially filled with flour and water and is eccentric to the axis of the external vessel. The gas pipe or duct is introduced into the widest space between the internal chamber and the external vessel, by means of which compressed gas is supplied; a flour reservoir encircles the end of the gas duct. The space between the two vessels is filled with water, the apparatus is charged with gas, and when the materials, under pressure, have absorbed the aeriform matter, communication between the chambers is opened by means of a valve. "When sufficient

“ liquid has thus been added to the flour in the inner chamber, the agitator is turned gently at first until the flour and water are properly incorporated. When properly mixed, the external cover is removed and the dough is taken out, when the dough at once swells up on the removal of the gaseous pressure.” Another routine of procedure, in which the flour reservoir is alone charged with flour may be used.

The process answers also for working up other plastic substances, such as are required in the manufacture of filters, &c.

[Printed, 4d. No Drawings.]

A.D. 1858, February 19.—No. 325.

OLARK, WILLIAM.—(*A communication.*)—“Improvements in filtering water, and in apparatus for the same.”

“This invention relates to a continuous pressure-filter for filtering a large quantity of water very rapidly (the filter being but of small size) by means of pressure obtained either from a lift and force pump, or from a reservoir having a sufficient head of water. The filtering material in this apparatus consists only of very fine sand, which is compressed in each filtering cylinder or chamber by means of diaphragms, which may be raised or lowered at will, thus replacing with advantage the porous stone hitherto employed for filtering purposes, the sand having none of the inconveniences attending the stone, as the salts of lime do not adhere to it and form a solid body, as they do with porous stones.”

In a modification of this invention, a vertical shaft, passing through the filtering cylinder carries a movable diaphragm having a screw thread at its upper part for adjusting it. Iron prongs on the shaft operate on the layers of sand during the cleansing process. The sand is placed between a fixed diaphragm and the above-mentioned movable diaphragm, and a small steam engine, mounted on the side of the filter, works the lift and force pump that supplies water to the filter. An air receiver is placed between the force pump and the water supply pipe.

The cleansing of the filter is accomplished by the water passing downwards instead of upwards through the filter.

[Printed, 8d. Drawing.]

A.D. 1858, March 3.—No. 423.

GRAVELEY, WILLIAM HENRY.—“An apparatus for purifying
“sea and other mineral waters, and rendering them fit to
“drink.”

The condenser fits over the boiler. The surface of the bottom of the boiler is corrugated, and its sides are cased and packed. “In the top of the boiler is an aperture, and a pipe
“or tube extending to near the top of the condenser fits
“over or into it;” outside of this pipe another pipe is fixed, and an air space is thus formed “all round the pipe which
“rises up and forms a continuation from the aperture in the
“boiler. The condenser is made of a dome shape, and is
“itself divided into two main compartments; into one the salt
“or other water to be purified enters, and into the other the
“steam from the water in the boiler rises, and becomes
“condensed by passing down through pipes fixed in the inner
“compartment containing the water to be purified. A pipe
“leads from the water supply chamber in the upper vessel
“into the boiler, and it and the boiler are fitted with suitable
“cocks. The steam after being condensed passes off through
“an outlet pipe into a filter, from whence it is to be drawn
“for use.”

A modified form of this apparatus, to be used in boats or elsewhere, may be heated by lamps and mounted in gimbals.
“The principle of the apparatus is the same as that already
“described.”

[Printed, 10*d*. Drawing.]

A.D. 1858, April 26.—No. 913.

BURLEIGH, BENJAMIN, and DANCHELL, FREDERIC LUDWIG.—(*Provisional protection only.*)—“Improvements in
“filters.”

The filter consists of an outer casing and an inner filtering medium of like form, and “so fastened or cemented to the
“casing between the inlet and the outlet that the fluid to be
“filtered must of necessity pass through the said filtering
“medium.” Another part of the invention consists in placing solid charcoal filtering blocks in pipes, so that the water is filtered by passing through them before being drawn off.

Pocket filters are constructed according to this invention.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 23.—No. 1415.

SPENCER, THOMAS.—“Improvements in the treatment of
“ iron ores and ferruginous sands, and certain applications
“ arising therefrom.”

This invention consists in the manufacture of the “magnetic
“ carbide of iron” by heat, and in the application of this
substance to a variety of useful purposes.

The ore of iron or ferruginous sand is first mixed with carbonaceous materials. The mixture is then “subjected to a
“ low red heat in a closed fire-brick chamber or oven until
“ the intended combination between the two substances (the
“ oxide of iron and the carbon) is completed.”

For the purification of water, the magnetic carbide is reduced by grinding to the condition of ordinary sand; it is then placed, as a filtering material, in a reservoir, tank, or other vessel. The thickness of the layer of magnetic carbide varies with the quality of the water operated upon. The specific action of this new material is (by oxidation) to deprive foul water of its colour, of organic or gaseous impurity, or of ill-flavour arising therefrom. Where water requires to be freed from turbidity, fine sand is added to the magnetic carbide. When very foul water is operated upon, a slimy matter is, in time, deposited upon the surface of the filter; this may be got rid of by removing a thin layer from the surface of the filter. The matter so removed is then to be washed or it may be completely revived by exposure to heat.

The purification of saccharine fluids and of alcoholic fluids is also set forth, together with other useful applications of this substance.

[Printed, 6d. No Drawings.]

A.D. 1858, July 3.—No. 1496.

BUHRING, CARL.—(*Provisional protection only.*)—“Im-
“ provements in apparatus for filtering liquids and other fluids
“ containing impurities.”

“My invention consists in employing” “a charcoal, porous
“ stone, or any other suitable filtering medium” “arranged
“ to float upon the liquids or other fluids to be filtered,” “so
“ that should the level of the liquids or other fluids change

“ or be changed, the position of the said filtering medium may similarly vary its position ” “ in order that the said liquids or other fluids may be always drawn through the filtering medium from or nearly from the surface. And I employ a pump, syphon, or other suitable instrument or apparatus for drawing or otherwise passing the liquids or fluids up through the filtering medium.”

[Printed, 4d. No Drawings.]

A.D. 1858, September 11.—No. 2066.

HINKS, JOSEPH LESTER.—“ A new or improved tap or cock for drawing off and filtering fluids.”

The essential part of this invention is claimed as being “ a tap or cock in which the liquid before being drawn off is made to pass into a chamber divided by a diaphragm or partition of filtering material, a pipe and valve being connected with each of the two parts into which the chamber is divided by the filtering material, so that by opening one or other of the valves, the liquid may be drawn from the said chamber either without filtration or be made to pass through the filtering material.”

[Printed, 6d. Drawing.]

A.D. 1858, September 22.—No. 2132.

HARRISON, CHARLES WEIGHTMAN.—(*Provisional protection only.*) — “ Improvements in filters for purifying air and liquids.”

The first part relates to purifying air by causing it to come into contact with “ a regulated surface of carbon ; ” the second to constructing portable water filters with a “ central chamber or well ” “ and the combination of pumping apparatus with portable filters.” “ I prefer to form these filters of moulded carbon ; ” the third part to constructing filtering cisterns on a large scale ; and the fourth to “ forming decolorizing filters of vegetable carbon and bone dust, these are well mixed together, either alone or with sawdust, then moulded in any desired shape, and afterwards burnt in a close oven.”

[Printed, 4d. No Drawings.]

A.D. 1858, October 19.—No. 2328.

WALKER, EDMUND.—(*A communication.*)—"An improved filter."

The filter consists of a wooden or metallic case, to the ends of which heads are secured. The inside frame, which holds the filtering medium, is made of two parts shutting into each other with felt or other filtering medium between them, and which is kept distended. The points of novelty are increasing the surface of the filtering medium by holding or supporting the fold as described; also the combination of pipes and heads having passages as described with the case constructed and operating as set forth.

[Printed, 8d. Drawing.]

• A.D. 1858, November 11.—No. 2535.

RAE, JAMES.—"Improvements in cisterns suitable for containing water for household purposes."

"I employ a four-sided, cylindrical, or other suitable form of vessel, having, in place of a flat bottom," "a bottom which inclines in every direction towards a central point, and at this point an opening is formed from which a pipe leads to the closets of the house, and by this pipe any sediment there may be from the water is carried away as rapidly as it falls." "Within the cistern I arrange a filter, consisting of a vessel having an opening in the top, which is filled by a sponge." "In the interior of the vessel is a perforated plate on which beds of filtering material rest." "From the lower part of the filter, under the perforated plate, a pipe passes to the exterior of the cistern, and terminates in a tap." "The bottom of the filter vessel is made to incline in every direction towards a central point in the same manner as the bottom of the cistern, and from this point another pipe leads, and also terminates in a tap outside the cistern;" cleansing may thus be effected.

"In order to prevent the possibility of any impure matter adhering to the inclined bottom of the cistern, I cause the supply pipe to pass down towards the bottom of the cistern in such a direction as to produce a circular motion within the cistern while the water is coming in."

A tap is placed to draw unfiltered water.

[Printed, 10d. Drawing.]

A.D. 1858, December 27.—No. 2962.

TURNER, FREDERICK WILLIAM.—“Improvements in steam engines, condensers, and steam boilers, and in promoting combustion in the furnaces of the same.”

The fourth improvement is the only one which can be noticed in this series of Abridgments. It consists “in the construction or application of steam-tight casings on certain portions of the external surface of steam boilers. For the purpose of distilling pure from impure water, I prefer, when boilers of the locomotive class are used, to construct such casings one on each side of the fire-box shell, and having no other communication with the interior of the boiler but by a pipe fitted to the top of such casing, and leading to the steam chest of the boiler; the pipe is fitted with a valve opening towards the steam chest of the boiler; whenever steam in the casing should attain a pressure slightly greater than that of the steam in the boiler it will escape into the boiler.”

[Printed, 1s. 4d. Drawings.]

1859.

A.D. 1859, February 19.—No. 459.

DE NORMANDY, ALPHONSE RENÉ LE MIRE.—“Improvements in an apparatus for obtaining fresh water from salt water.”

This invention relates to an improvement upon the copper float to the valve for regulating the supply of salt water to the evaporating cylinder, in the invention set forth in No. 1252, A.D. 1856. According to the present invention, this float is made of earthenware or glass, instead of copper.

A further improvement upon the above-mentioned invention consists “in uniting the priming and feed box into one vessel of suitable size, and in such a way that the steam may, as heretofore, deposit and return to the evaporator any priming or salt water which may be mechanically projected or carried over with the steam, but that on the other hand,

“ the said box may, in acting as a priming box, moderate or arrest the splashing induced by and at the same time serve as a feed box also.”

Another improvement consists in a method of constructing the series of pipes used in the evaporator, or in the condenser. The two extremities of such pipes, previously cut in proper lengths, are passed into a plate of cast iron containing holes somewhat larger than the pipes. India-rubber rings or other packings are then applied, so that on placing over the pipes another cast-iron plate, it may act as the gland of a stuffing box. The pipes are thus secured steamtight into a bundle or sheaf.

[Printed, 8d. Drawing.]

A.D. 1859, February 24.—No. 505.

WAGNER, JEAN HENRI GUILLAUME DANIEL.—“ Apparatus for cleaning water, and removing all matters in suspension and dissolution contained in it, water intended to feed generators of all sorts (applicable also to other purposes), which besides previous to its getting into the generators, is heated to the highest degree without almost any expense.”

The first claim is for “the application of the principles upon which is based the construction of the apparatus described, that is to say:—1st. The subdivision of the water to be purified into thin continuous sheets or films of indefinite length, to be heated in this extended state. 2ndly. The double traverse of the liquid film or sheet over” two surfaces of partitions, “upon which are deposited and kept adherent all incrustations. 3rdly. The heating of the liquid film or sheet by the direct contact of steam, and on surfaces directly heated by steam. 4thly. The condensation of the escaping or waste steam during its continuous flow, being increased by means of the partition work described in the interior of the apparatus, which flow is always inversely to that of the water current or of any other liquid to be heated.”

A cage is interposed between two parts of the outlet pipe. This cage has a copper sieve covered with a disc of filtering felt.

This invention may be adapted to marine boilers to produce therefrom potable water. The precipitated salt is kept back by means of a layer of sand.

[Printed, 2s. 8d. Drawings.]

A.D. 1859, March 18.—No. 688.

CLEGG, ROBERT, and FELL, RICHARD.—(*Provisional protection only.*)—"Improved apparatus for obtaining aerated " fresh water from salt water."

This apparatus is composed of five principal parts, namely, a generator, condenser, vacuum chamber, air pump, and closed tank. The generator is an air-tight vessel containing longitudinal water-tight chambers for the passage therethrough of hot air from the "cabouse." In the condenser (an air-tight vessel) are a series of water-tight compartmented troughs, connected together by vertical pipes, the lowermost of which passes into the bottom of the vacuum chamber. The bottom of the vacuum chamber is connected by a pipe to the bottom of the air pump, from whence proceeds another pipe to the fresh water tank. The apparatus being exhausted of air, and the generator charged with salt water, the steam therefrom passes to the condenser which is filled with cold salt water. At the commencement of the process the troughs are filled with fresh water, and mixed steam and air from the generator pass into the troughs in succession, the air pump forcing the fresh aerated water into the tank.

To remove the saturated water from the bottom of the generator periodically, and simultaneously to admit the water from the condenser into the generator, two flexible bags are employed in connection with vibrating levers. The partial vacuum caused by the evaporation of the water in the generator causes one bag to collapse, thereby opening a cock (worked by the top lever) and letting water flow from the condenser into the generator. The other lever, being acted upon by the top lever, lets out some of the saturated water, " and as the generator fills with water the cocks will be closed " by a reverse movement of the levers."

The apparatus may be connected to a steam boiler instead of to a "cabouse."

Pieces of fire-clay and bone ash (mixed) may be placed in the compartments of the condenser to neutralize any vegetable matter contained in the water.

[Printed, 4*l*. No Drawings.]

A.D. 1859, April 23.—No. 1025.

MARSHALL, JOHN, junior.—“Improvements in filtering and “depurating fluids.”

This invention relates to employing for the above purposes a reservoir of suitable shape and strength to hold the liquid to be operated upon; also to a novel arrangement of the filtering surfaces through which the fluid is forced. The cylinder is constructed with an aperture at the top through which it is filled, and with an aperture at the bottom through which fluid is forced by means of an ordinary force pump. The filtering chambers are rectangular hollow frames covered on both sides with filtering material, which is held down by wire gauze or other suitable substance.

To exert chemical action during filtering, the filter boxes, are charged with suitable material.

Knives or scrapers are used to clean the surface of the filtering material.

[Printed, 10*l*. Drawing.]

A.D. 1859, April 27.—No. 1055.

FANSHAWE, HENRY RICHARDSON.—“Improved apparatus “or mechanism for drawing off, filtering, and gauging liquids “in butts, barrels, casks, and such like vessels, preserving “the contents from deterioration from contact with atmospheric air.”

An air and waterproof bag is formed with two holes opposite each other, around which short tubes of the same material as the bag are secured air-tight. A flexible pipe passes down the centre of the bag of sufficient length to reach from the bung hole to the bottom of the cask. At the lower end of the pipe is fixed a metallic vessel, which when filled with filtering materials forms the filter. If a rigid instead of a flexible tube be employed it may be used to act as a gauging or registering apparatus. What is claimed as novel is “the use of and “adaptation of a bag with its adjuncts, which by the intro-

"duction of air pressure will occupy the void formed as the liquid is drawn off; sufficient pressure being kept up by this means to allow a free draught. Also the guaging and filtering apparatus herein-before described."

[Printed, 4d. No Drawing.]

A.D. 1859, May 28.—No. 1320.

GRAVELEY, WILLIAM HENRY. — "Improvements in apparatuses for purifying and aerating sea water, parts of which may be employed for cooking and baking purposes."

The same furnace heats the cooking arrangements and generates steam from one or two steam boilers. One boiler is tubular, and its steam chest is divided into two compartments by a partially perforated plate; inside the lower compartment is a small dome, perforated up to a certain height, containing a globular valve into the seating of which a pipe opens. This pipe carries off any salt water that may rise with the steam.

The said boiler is tubular and encloses an air tube, outside of which is fixed another boiler containing tubes in connection with steam pipes from the chest of the internal boiler, for the purpose of boiling sea water. Air is forced into the second boiler, which has another steam chest and dome, as in the first boiler; air is also drawn into this dome. A jet of steam is used to force the air into the boiler and dome respectively. Steam pipes from the domes lead to a box containing fresh water. The water and steam from this box then proceed to a condenser and filter, whence aerated fresh water is discharged. A pumping engine keeps a constant supply of cold sea water to the condenser, and of warm salt water from the condenser to the boilers.

In a modified apparatus, the action is the same as that above described, but only a single boiler is used.

In another arrangement the steam proceeds round the cooking boilers, thence to the condenser and filter, from which it is drawn off as pure water.

[Printed, 1s. 10d. Drawings.]

A.D. 1859, June 21.—No. 1487.

HOW, ANDREW PEDDIE.—(*Provisional protection only.*) — "Improvements in self-supplying distilling apparatus, and in apparatus for cooking combined therewith."

"These improvements consist, firstly, in attaching to apparatus for the distillation of fresh from salt water, a donkey engine and pump for supplying the same, thus dispensing with hand pumps and over-head cistern, usually fitted thereto.

"Secondly, in combining such improved distilling apparatus herein described with an ordinary cooking apparatus. In this arrangement two furnaces are employed, which may be used together or separately, when the former, the products of combustion from the cooking furnace, may be made to pass through the furnace of the distilling apparatus, and thus consume the smoke from the furnace of the cooking apparatus."

[Printed, 4d. No Drawings.]

A.D. 1859, June 25.—No. 1528.

ROBERTS, JOHN.—"Improvements in filters."

"I form a vessel, of any suitable shape, of porous earthenware open at the top, but with a loose cover to close it and keep out dust. This vessel I pierce with holes above the level at which I desire to retain the filtered water in the vessel, in order to allow of the free circulation of air therein. In the cooler I suspend a smaller vessel of a cylindrical or other convenient shape, made of still more porous earthenware, which vessel receives the water to be filtered, and allows it to percolate through the sides and bottom thereof. The outer vessel or cooler I fit with a tap for drawing off the water as it is required for use."

For military purposes, a conical filter is shown in the drawings; this has ribbed sides, and is porous.

[Printed, 6d. Drawing.]

A.D. 1859, August 13.—No. 1871.

CLEGG, ROBERT, and FELL, RICHARD.—"Apparatus for obtaining aerated fresh water from salt water."

This apparatus consists of a generator, condenser, vacuum chamber, air pump, and closed tank. Hot air from the "cabouse" passes through longitudinal chambers in the generator. Water-tight compartmented troughs in the condenser are connected together by vertical pipes, the lowermost

of which passes into the bottom of the vacuum chamber. The bottom of the vacuum chamber is connected by a pipe to the bottom of the air pump, from whence proceeds another pipe to the fresh water tank. The apparatus being exhausted of air, and the generator charged with salt water, the steam therefrom passes to the condenser, which is filled with cold salt water. At the commencement of the process the troughs are filled with fresh water, and mixed steam and air from the generator pass into the troughs in succession, the air pump forcing the fresh aerated water into the tank.

To remove the saturated water from the bottom of the generator periodically, and simultaneously to admit the water from the condenser into the generator, two flexible bags are employed in connection with vibrating levers. The partial vacuum caused by the evaporation of the water in the generator causes one bag to collapse, thereby opening a cock (worked by the top lever) and letting water flow from the condenser into the generator. The other lever, being acted upon by the top lever, lets out some of the saturated water, "and as the generator fills with water the cocks will be closed by a reverse movement of the levers."

The apparatus may be connected to a steam boiler instead of to a "cabouse."

Fire-clay and bone ash in the condenser neutralises vegetable matter in the water.

In the Final Specification high pressure steam is said to be united with air in the condenser by the application of charcoal. A float in one of the fresh-water tanks is used "in connection with a governor, to reverse the action of vacuum in exhausting either of the tanks of air or water."

[Printed, 1s. 2d. Drawings.]

A.D. 1859, September 24.—No. 2165.

NORMANDY, ALPHONSE RENÉ LE MIRE.—"Improvements in the application of steam for cooking food."

"My improvements consist in connecting a boiler under pressure with a chamber or chambers, into which utensils may be partly or wholly immersed, so that on admitting the steam from the said boiler into the chamber or chambers round the said vessels, the food which is to be put into

“ them may be cooked by it in such a way that, practically speaking, by means of an instrument called a steam trap, no steam is allowed to escape from the chambers containing the cooking vessels, except it have been previously condensed, the steam trap allowing nothing to escape but the water resulting from the condensation of the steam round the cooking utensils. This condensed water may then be put in communication with the condenser or with the refrigerator (or both) of one of my machines, known as Normandy’s patent fresh water distilling apparatus, and it will be thereby converted into aerated fresh water of excellent quality.”

[Printed, 1s. Drawings.]

A.D. 1859, October 15.—No. 2359.

SMITH, ROBERT. — “The purification of water and other fluids.”

“For the purpose of purifying sewage water, or such water as may, for example, be found in the public docks and other such places upon the banks of the river Thames and elsewhere, which may, in addition to the usual character of sewage and other matter, also contain alluvial, tarry, and other matters, I employ a compost or mixture of pulverized or powdered sulphur and turpentine (or their chemical equivalents), and which mixture I introduce into the water to be treated, whereupon, by the chemical and mechanical actions set up the impurities are partially dissipated and partly deposited or thrown down, leaving the water clear and bright. The proportions of turpentine and sulphur are, of course, varied to suit the character and extent of the impurities contained in the fluid to be treated, and where necessary, I combine with such compost any of the ordinary and well-known agents employed for depuritating, deodorizing, and otherwise acting upon animal or vegetable matters in a state of decomposition.”

In the Provisional Specification it is proposed to use powdered charcoal in combination with powdered sulphur and turpentine.

[Printed, 4d. No Drawings.]

A.D. 1859, October 22.—No. 2421.

DAHLKE, JULIUS.—(*Provisional protection only*).—"Improvements in the preparation of charcoal, and its application to the purification of water, and the preservation of organic matters, and in apparatus connected therewith."

A plastic material is formed containing animal charcoal, quartz, coal tar, and fire-clay, and is used to mould the plates or cylinders that form the filters or other articles; the said articles are then heated to redness in closed vessels.

One form of filter consists of an earthenware cylindrical vessel having a plate of prepared charcoal cemented to a ledge half way down the said vessel. Water is poured in at the top and drawn off at the bottom.

"An improvement in filters consists in forming the filtering and purifying medium in two parts, the one thick and permanent, while the other & upper part is removable for the purpose of cleansing it." The purifying medium is enclosed in a cylinder of gutta percha, "enclosed below by a funnel bottom terminating in a pipe." The cylinder is flanged at top and receives a rim "which dips inside the vessel, forming an internal flange, in which the upper plate of filtering material is fixed; on the top is placed a funnel cover, terminating in a pipe; this cover is bolted down upon the other flanges, so as to grip the three parts together. Thus, by removing the cover, the loose flange and upper plate of charcoal can be removed to be cleansed by scrubbing or making it red hot, and when together the whole forms an air-tight vessel." "For large purifiers, such as the filter beds of water works," the inventor lays down "plates of prepared charcoal, cemented together, so that the water must pass through the charcoal."

[Printed, 4d. No Drawings.]

A.D. 1859, December 19.—No. 2885.

* BATHGATE, ANDREW, and WILSON, JOHN HAYS.—"Improved apparatus for distilling water and cooking on board ship."

This apparatus consists of a "parallelogramical" or other suitably shaped metallic chamber, having a central fireplace and ash-pit and a baking oven at one side. The top of

the casing above the fire place and the flue above the oven are perforated to receive the bottoms of the cooking vessels.

A small vertical steam boiler is on the opposite side of the fire-place to the oven. The lower end of the boiler is inserted through a hole in the top of the casing, resting thereon half way from the bottom by means of a flange. The boiler is fitted with gauge cocks, and has a man-hole to remove incrustation. "The steam pipe is carried upwards, and connected to a condensing worm placed in a tank, which is elevated above the camboose. The worm delivery pipe is carried down to any convenient position, and the distilled water received in a suitable vessel. The boiler is supplied with water from the worm chest, and the worm tank is supplied with sea water by the ordinary ship's force pump.

"The worm cistern is enclosed on the top, and is provided with a short vertical air pipe, and the bottom of the tank has an outlet pipe with a shut-off cock upon it, for the purpose of running off the water which surrounds the worm, should it get too hot, and to allow the vessel to be refilled with cold water."

[Printed, 8d. Drawing.]

1860.

A.D. 1860, February 4.—No. 296.

DAHLKE, JULIUS GUSTAV.—"Improved filtering compositions and improvements in filtering vessels and apparatuses."

Detailed receipts for compounding the filtering composition are given. Briefly stated, those compositions are formed of silica, pumicestone, and animal charcoal combined together in accordance with the directions given. A portable filter is constructed by attaching to a ring a bag of india-rubber, and fitting into the bottom of the bag a disc of the filtering composition. "I form a portable syphon filter by fitting into a cylindrical or other shaped vessel a block of the filtering composition" "in manner following:—The block has a central aperture formed in it extending down about two-thirds of the length of the block; a plug, with an aperture

“ through it, is screwed air-tight through the top of the vessel into the opening in the block, a space is left between the block and the sides and the bottom of the vessel; two or more stoppers are inserted over this space in the top or cover of this vessel. The bottom of the vessel is composed of a plate of filtering material more porous than the internal filtering block; a syphon tube is fixed to the plug, and in the tube I insert a tap or stopper.”

The silica may be impregnated with hydrated oxide of iron. Vegetable charcoal may take the place of animal charcoal; also bone dust or saw dust may form a part of the filtering composition.

A cylindrical filter for large supplies, to filter upwards, and to cleanse downwards, is shown in the drawings.

[Printed, 10d. Drawing.]

A.D. 1860, February 22.—No. 477.

LECOUPEUR, VICTOR EUGÈNE.—“A new or improved system of filters.”

“The principle upon which these filters act is to filter the water from the bottom upwards under the influence of pressure, which, in a great measure, aids the settling of the matters held in suspension to the bottom of the filter, also requiring less frequent cleansing and renewing of the filtering material.” “By the use of this improved filter water can be obtained from the different taps, either in the ordinary or clarified state, or both in a purified and clarified state.”

A tank filter, a “house fountain,” and portable filters, on the above principle, are shown in the drawings.

[Printed, 10d. Drawings.]

A.D. 1860, March 27.—No. 786.

DE NORMANDY, ALPHONSE RENÉ le MIRE.—“Improvements in obtaining fresh water from salt water.”

“The invention consists of improvements in aerating the steam supplied from a boiler under pressure, so as to condense it into aerated fresh water. The pressure steam is aerated by regulating the quantity supplied, so as not to exceed the power of the condenser, allowing it to expand into little or no pressure steam before or as it enters the

“ condenser, and introducing into the steam thus expanded the air liberated from the condensing salt water.” The inventor does this “ either by making the steam pipe as it enters the condenser sufficiently large, and putting it in communication with the air liberated from the salt water used for condensation, or else by putting the air liberated from the condensing salt water in communication with the cap of the condenser tubes. The condensed water thus aerated is then passed through a refrigerator, and thence through animal charcoal, whence it issues in the state of aerated and purified fresh water.”

The drawing shows the above-described method applied to an elevated condenser, with a cap and vertical tubes, in connection with a lower refrigerator having horizontal tubes. Salt water, for condensing, enters the lower part of the casing of the refrigerator and proceeds to about the middle of the condenser's casing, where it has its exit through a vertical pipe. The steam is aerated in the above-mentioned cap, and condensed in the lower chamber of the condenser; it then proceeds, by gravity, through the refrigerator tubes to the exit pipe for aerated fresh water.

[Printed, 6d. Drawing.]

A.D. 1860, April 21.—No. 1001.

MACNAB, WILLIAM.—“ Improvements in and connected with marine and other steam engines.”

According to the third part of this invention, “ an apparatus is provided for evaporating sea water to be distilled or condensed for making up the waste and leakage occurring in the main boiler, engines, and condenser, and at the same time provide fresh water for various uses on board the vessel.”

To this end an auxiliary boiler or boilers is or are used “ to effect the evaporation of the sea water at a low pressure, and the steam thus produced is elevated to a high temperature by means of arrangements for superheating it in connection with the auxiliary boiler or boilers, the steam so generated and superheated being then passed into the jackets surrounding the cylinders, valve casings, and other parts of the engines previously to passing to the distilling

“ or condensing apparatus. In this way the advantage of
 “ encompassing the various parts of the engines with jackets
 “ supplied with steam of low pressure, but high temperature,
 “ can be obtained with an auxiliary boiler or boilers of a
 “ simple, light, and efficient construction, whilst a great
 “ portion of the heat required for evaporating the sea water
 “ is thus utilised in the jackets. The sea water to be eva-
 “ porated may be taken from that which has passed through
 “ the condenser, thereby utilising the heat it has taken up in
 “ the condenser.”

[Printed, 10d. Drawing.]

A.D. 1860, May 5.—No. 1120.

STEVENS, CHARLES.—(*A communication from Jean Cyrille Noël.*)—(*Provisional protection only.*)—“ An improved means
 “ and apparatus for transporting and preserving live fish, and
 “ keeping water fresh for a long period.”

In order to supply oxygen to the water, either the water is thrown into the air, or the air is caused to enter the water in small currents.

According to one plan, the air is forced underneath the false bottom of a box which contains the water. The air may be supplied by means of a bellows, and the false bottom has a number of very small holes in it.

According to another method, the water is thrown against the top of the box by means of four or more paddles, and on falling it imbibes a sufficient quantity of air. Also air is made to enter by an orifice at the top and to pass out by openings in the circumference.

Another variation on the above plan consists in using an endless chain of buckets. The water raised falls in a shower, and air is carried down to the bottom of the receptacle by means of the buckets.

Other apparatus may be used to effect the above purpose.

“ The above invention can likewise be applied to the preservation of water which it may be required to retain fresh
 “ for a long period, such as for use on board ship.”

[Printed, 4d. No Drawings.]

A.D. 1860, June 20.—No. 1490.

VERWEY, ANTON.—(*Provisional protection only.*)—"Improvements in the proportions of ingredients and mode of manufacture of a chemical compound for softening water."
 "To one gallon of water must be added two grains (a little more or less) of the dry commercial bicarbonate of soda, for each degree of permanent hardness, and for each grain of magnesian salts an additional quantity of silicate of soda containing 5.4 grains of silica;" to manufacture a powder for these purposes, "the silicate of soda in solution must be well mixed with the bicarbonate of soda in a dry state, and the compound thus formed allowed to dry and harden. It is then ground in a suitable mill, and after passing through a dressing machine the powder is fit for use."

[Printed, 4d. No Drawings.]

A.D. 1860, July 16.—No. 1712.

DANCHELL, FREDERICK LUDEWIG HAHN.—"Improvements in filters."

The improved filtering apparatus consists of a vessel made of clay, metal, glass, or other suitable material, provided with one or more openings at its lower part for the admission of the filtering material, and of the water to be filtered. "The upper end in the interior of the said vessel is provided with a small chamber perforated with small holes, or construction of some porous material for the fluid to pass through, and at the same time to hold back the particles of the filtering material." "This said chamber is also provided with a larger hole for the insertion of a tube, which has to serve as outlet for the fluid after having entered the said chamber. The said vessel is then filled with the filtering material, and closed with a cock or otherwise to prevent the said filtering material from falling out. The apparatus is then ready for use, and may be applied for portable filters, cisterns, tanks, or other holders of fluid."

The apparatus is independent, and is "capable of being detached either inside or outside to any kind of convenient holder of water or other fluid for the purpose of filtration."

The fluid percolates the filtering material by ascension to the exit tube,

[Printed, 6d. Drawing.]

A.D. 1860, August 1.—No. 1861.

JACKSON, JOSHUA.—An invention for “purifying and cooling water and atmospheric air, which he calls ‘the carbonic ‘aerial water and air purifier and cooler.’”

“I make a series of discs, in shape (somewhat resembling a crown piece) of one or more metal or wood hoops or rings, over each end of which I stretch a piece of haircloth, wire gauze, or perforated metal. I fill each disc (excepting one in each series, which I fill with sponge and call a filter) or purifier with purified wood, charcoal, or carbon, which I make from sawdust in an open furnace, and boil it in water until I have extracted all its saline and other impurities.”
 “I construct a disc either of three perpendiculars, or of one perpendicular, and two horizontal hoops or rings, and two circular pieces of haircloth. With these materials I form a sort of circular shell, in shape very much like an empty watch case, which I fill with purified charcoal or carbon of five different degrees of fineness.”

Methods for the preparation of charcoal are given.

[Printed, 6d. No Drawings.]

A.D. 1860, August 21.—No. 2017.

PERKINS, ANGLIER MARCH.—“Improvements in apparatus for distilling sea and other water.”

A cylindrical boiler has an internal fire-place and a steam tight metal jacket that leaves a space between the entire exterior of the boiler and itself; the latter point constitutes the peculiarity of this invention. A passage at the upper part of the boiler communicates with the jacket, so that, as fast as it is generated, the steam passes into the said jacket and is condensed therein, as the contact of the air continually cools the outside of the jacket. The water thus obtained by condensation, flows out at the bottom of the jacket by a syphon pipe. When more water is evaporated than can be condensed in the jacket, a part of the steam is conducted into tubes that are cooled by the contact of air. The supply cistern of this arrangement is filled with a filtering material, say charcoal, to purify the water before it enters the boiler. A brine pipe, with a regulating tap, discharges the water when it becomes saturated with salt; there is also a

hand hole for removing sediment or incrustation from the boiler. The effect of this combination of boiler with jacket, and of the feed pipe passing through the distilled water is to heat the feed water and to cool the distilled water. The distilled water may be filtered through charcoal.

In a larger apparatus than that above described, shown in the drawings, instead of a furnace, the boiler or still has a coil of pipe connected to a steam boiler that is worked to a pressure of ten pounds per square inch or more; the outer end of the coil is so connected to a steam trap as to regulate the proper quantity of steam. A congress of tubes is attached to the top of the steam case when it is required to distil more water.

[Printed, 1s. 4d. Drawings.]

A.D. 1860, November 3.—No. 2699.

WRIGLEY, THOMAS.—“Improvements in apparatus for filtering water and other liquids.”

“According to my invention, I cause the liquid to pass into the filtering medium in a horizontal in contradistinction to a vertical direction. Thus I use two vertical tubes or other shaped vessels, the one containing the filtering medium, the other the liquid to be filtered; and I form a combined apparatus by placing a number of tubes or chambers in one vessel.”

[Printed, 6d. Drawing.]

A.D. 1860, November 16.—No. 2824.

LAVATER, MANUEL LEOPOLD JONAS.—“Improvements in portable or syphon pillars.”

At the one end of a tube is placed a flexible bag, into which is packed sponge, charcoal, or other filtering material. “In using this filter, the enlarged end is placed in a vessel containing the water or liquid to be filtered, and the other end of the tube is allowed to hang over the edge of the vessel, so that its outer end descends to a lower level than the end which is within the vessel, then the liquid having been drawn over by sucking with the mouth at the end of the tube exterior of the vessel, the apparatus will continue to act as a syphon, and draw the water over through the filtering material contained in the enlargement or bag.”

[Printed, 4d. No Drawings.]

A.D. 1860, December 11.—No. 3039.

VERWEY, ANTON.—“Improvements in the proportions of “ ingredients and mode of manufacture of a chemical compound for softening water.”

The object of this invention is the production, from a mixture of carbonate and bicarbonate of soda and of liquid silicate of soda, of a solid compound capable of being reduced to a powder readily soluble in water. Two claims are made; one is for the production of the foregoing compound, the other for “the useful application of the solid compound” “in “ a state of powder for purifying and softening hard waters.”

[Printed, 4d. No Drawings.]

A.D. 1860, December 29.—No. 3192.

CHAMBERLAIN, HUMPHREY.—(*Letters Patent void for want of Final Specification.*)—“Improvements in the preparation of clay for pottery purposes, which improvements are also “ applicable to filtering or cleansing liquids.”

This invention consists in the preparation of “slip” to deprive it of its superfluous moisture so as to render it fit for the potter, but it is said to be also applicable to the filtering “ or refining of various other liquids, such as oils & water.”

A tank is prepared, “having a layer of plaster of Paris over “ its bottom, into which tank the clay in the liquid state or “ ‘slip’ is poured; this tank is in connection with any convenient exhausting apparatus; the plaster of Paris readily “ absorbs the superfluous moisture from the clay, whilst the “ exhausting apparatus being put into operation will again “ exhaust or deprive the plaster of Paris of the water drawn “ from the clay.”

“The object of this invention may also be effected by using “ the apparatus above described in a different manner, that “ is, in place of exhausting the moisture, driving it off or “ expelling it by means of hot air driven into the mass. Or “ it may be pumped into a close chamber, of which some “ surfaces are composed of plaster. After the chamber is full, “ and when the pressure increases, the water will be forced “ through the plaster, leaving the plastic clay or other “ material in the chamber. The pressure can be got by a “ head or other means than pumping.”

[Printed, 4d. No Drawings.]

A.D. 1860, December 31.—No. 3193.

DE BUFFON, BENJAMIN NADAULT. — “Improvements in ‘apparatuses for clarifying and purifying water and other liquids.’”

“The chief characteristics of the improved apparatus are
 “1st, being formed of a concentric tube and cylinder, both
 “made of perforated and inoxidable sheets of metal; and,
 “2nd, containing in the space between the two cylinders an
 “elastic and compressible filtering matter of such a kind that
 “by compressing it in a press a matter having a greater or
 “lesser degree of porosity is obtained according to the nature
 “of the liquor to be clarified and the pressure under which
 “the flowing takes place.” The filtering material employed
 is wool shearings.

The wool is prepared by washing, steeping in a solution of tannin; sulphate of copper or sulphate of iron is added. The wool is, finally, dried on frames, washed and pressed.

[Printed, 10d. Drawing.]

1861.

A.D. 1861, January 8.—No. 45.

CLARK, WILLIAM.—(*A communication from Jules Pacôme, Alfred Havard.*)—(*Provisional protection only.*)—“Improvements in filters.”

This invention relates to a portable filter, which is formed,
 “1st, of a casing of sheet iron or other material, which serves
 “to enclose all the parts of a filter when taken to pieces, and
 “also a stand for it when in use; 2ndly, of a large bottle of
 “thin india-rubber used as a reservoir; this comprises two
 “compartments, the lower one containing the filtered water,
 “which is separated from the upper and larger compartment
 “containing the unfiltered water by a diaphragm of filtering
 “matter. To the reservoir containing the filtered water is
 “screwed an escape tap.”

This filter “is also provided with an air escape tube, and
 “with a pump or suction tube, by exhausting which the water
 “to be filtered is forced through.”

[Printed, 4d. No Drawings.]

A.D. 1861, January 17.—No. 132.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication from G. Dardel.*)—"Improvements in apparatus and materials " for filtering water and other liquids."

This invention consists, 1st, in offering a double vertical filtering surface to the liquid; 2nd, in applying hydraulic pressure to the construction of filtering apparatus; 3rd, in a mode of treating the material employed for filtering, so as to render it less liable to decomposition than it otherwise would be. What is preferred as a filtering material is woollen waste or shearings prepared in a special manner.

The woollen shearings are prepared in the following manner:—

Soaking in a bath containing bleaching lye and carbonate of soda. Then in a bath containing alum and cream of tartar. The wool is then exposed to the air, boiled in a gallnut solution, and lastly, in a solution of acetate or sulphate of iron.

[Printed, 10d. Drawings.]

A.D. 1861, January 22.—No. 170.

COOKE, WILLIAM.—"Improvements in apparatus for filtering."

This apparatus is hollow; it is composed of any suitable material, and is filled with a filtering substance, such as sand or charcoal. The apparatus has necks or openings in which is placed sponge or other substance calculated to prevent the impurities contained in water from entering the vessel. Through this substance and the above-mentioned necks or openings one or more tubes are passed for the purpose of conveying away the filtered water. The lower part of the neck of the filter is of a hollow or concave shape for the purpose of holding impurities, and the vessel may be cleansed by turning on taps connected with the neck.

The drawings show filters of the ordinary shape as well as those adapted for counters, shelves, or wall recesses.

[Printed, 10d. Drawings.]

A.D. 1861, February 2.—No. 280.

CAMERON, JOHN.—"Improvements in purifying water for " the supply of steam boilers and other uses."

"This invention consists in mixing with the water before it is put into the boiler a certain quantity of partially decayed vegetable matter such as peat, black vegetable mould, leaves, twigs, and roots of trees, or vegetable matter charred by acid in order to obtain humic and ulmic compounds, or old wood in a partially decayed state, or grasses or vegetable mould of any description answering the purpose." The inventor employs "these substances for the organic compounds which they contain, such as humin, ulmin, humic acid, ulmic acid, crenic acid, and apocrenic acid, with others of a similar character which exist in partially decayed vegetable matter. "These compounds have a powerful affinity for lime, magnesia, oxide of iron and alumina, and form with them insoluble compounds which precipitate and leave the water so treated pure and soft and well adapted for the supply of steam boilers and for other purposes."

In carrying out this invention, a double tank is used, one division being upon a little lower level than the other. Peat, in preference, is put into the water in the upper half of the tank, and the whole is left to rest for some time, until (by testing) it is found that the whole of the earthy substances are precipitated. The water is then run into the lower division of the tank, from which the purified water may be drawn. The operation is then repeated, occasionally stirring up the peat in the higher tank.

[Printed, 4d. No Drawings.]

A. D. 1861, March 13.—No. 617.

HEBSON, DOUGLAS, and RAMSDEN, WILLIAM GRANDAGE.—
"Improvements in apparatus for obtaining fresh water from salt water."

The salt water in a cylindrical vessel is evaporated by means of a coil of steam pipes placed therein. "The said vessel we also provide with an exit pipe leading from the upper part thereof, by which the steam evaporated may be conveyed to a worm or other arrangement of pipes immersed in cold water, and thereby condensed in the usual manner; but in the case of steam ships having engines fitted with surface condensers, the said exit pipe from the evaporating vessel may be connected directly to these condensers, by which

" means a partial vacuum will be maintained in the said " evaporating vessel." " To increase the economic effect the " pipe or pipes conveying steam from the boilers may be " passed through the furnaces or uptake so as to superheat " the steam before discharging it into the salt water which is " to be evaporated." The evaporating vessel may be surrounded with a steam jacket, or a covering of felt.

When a donkey engine is in use on board ship, the exhaust steam from it may be admitted into the evaporating vessel.

The supply of steam and water to the evaporating vessel may be regulated by suitable cocks and pipes. By similar means the brine which accumulates in working the apparatus may be blown off.

[Printed, *ed.* Drawing.]

A.D. 1861, April 27.—No. 1062.

MORGAN, THOMAS VAUGHAN, and DAHLKE, JULIUS GUSTAV.—(*Provisional protection only.*)—" Improved filtering " agents, one of which is applicable in the manufacture of " crucibles."

" Our chief filtering agent, and which we also use in the " composition of which we make our crucibles, is the material " remaining after the burning or destructive distillation of " the substance known as boghead coal or Torbane Hill " mineral. We manufacture our composition for filtering by " combining with the said boghead material, animal charcoal, " vegetable charcoal, or sand, all or any one or more of them, " and in some cases we employ the said material remaining " after the distillation of the Torbane Hill mineral by itself " in a granular state as a filtering agent. We prepare our " composition for the manufacture of crucibles by mixing " with the said boghead material oily or fatty matters."

[Printed, *4d.* No Drawings.]

A.D. 1861, May 24.—No. 1316.

DANCHELL, FREDERICK HAHN.—(*Provisional protection only.*)—" Improved methods of and apparatus for ascertaining " and removing impurities contained in water."

The method for removing impurities from water is forcing water, by means of a pump, through a purifying medium in

such manner that the purified water shall be discharged direct from the filtering apparatus instead of from the pump spout. The pump used is constructed so that the water is raised and forced by means of the alternate contraction and expansion of a tube or other vessel formed of elastic material. The invention likewise consists of a floating filtering vessel, to go along-side ships, &c.

[Printed, 4*l*. No Drawings.]

A.D. 1861, June 10.—No. 1473.

BROWN, ANDREW.—“Improvements in obtaining fresh water “ at sea by means of distilling apparatus combined with the “ cooking stoves or otherwise.”

When the still or evaporating boiler is used in connection with cooking stoves, it is placed towards the top and back of the same. The still is supplied with sea or salt water through the condensing worm chamber from the cistern in ordinary use.

A distinguishing feature of this invention is that the feed is self-acting. A float is placed on the still, and has affixed to it a rod “which passes through the cover of the said still and “ couples to the end of a lever supported on a bracket. At “ the other end of the lever, attached to a rod, with length- “ regulating spring and nut, is a valve or tap situated in the “ salt water supply pipe. As the water falls in the still the “ float descends and opens the supply, and vice versa.”

The supply to the condensing chamber may be carried off as waste. “The tap at the inlet to the still is made to carry off “ the brine continually collecting in the said still.”

In the Final Specification the above-mentioned length-regulating spring and nut are connected at the float spindle end.

A filter is shown in the drawings “whereby a sweeter and “ more palatable water can be obtained.” The filter contains “charcoal and other porous media.”

[Printed, 10*d*. Drawings.]

A.D. 1861, August 26.—No. 2129.

NEWTON, WILLIAM EDWARD.—(*A communication from Horatio Nelson Fryatt.*)—(*Provisional protection only.*)— “Improved machinery for filtering liquids, decolorizing sac- “charine and other juices, and rectifying alcoholic liquors.”

This apparatus is constructed on the principle of the centrifugal drying machine, and beside the purposes above-mentioned, is to be used "generally for filtration and for the separation of liquids from impurities." It is "provided with a concentric annular compartment outside of a central chamber, and closed at top and bottom. The inner and outer peripheries or sides of the said annular chamber are formed of perforated metal, so as to contain pulverized charcoal or other filtering substance, so that the liquid when introduced into the central chamber shall be forced by centrifugal action from the central chamber, through the previous inner periphery of the annular chamber, thence through the material contained in the said annular chamber, and through the outer pervious side into the space between the filtering chamber and the outer case." "When the liquid has been forced by the centrifugal action of the apparatus through the filtering materials, it is allowed to escape through a suitable opening made in the outer casing, and may be received into a receptacle below."

[Printed, 4d. No Drawings.]

A.D. 1861, September 16.—No. 2312.

RANSOME, FREDERIC MATTLAND, and RANSOME, ERNEST LESLIE.—"Improvements in treating stone, bricks, and other surfaces, and in the manufacture of filters."

The methods of treating stone, brick, and other surfaces consist in producing upon such surfaces an insoluble silicate of lime or other insoluble silicate.

In the manufacture of filters, or parts of filters, sand, clay, and silicate of soda are mixed into a plastic state for moulding. By means of cored moulds this mixture is pressed into the shape of "tubes of a triangular form in section." These tubes are then removed from the mould, dried, brought to a red heat in a kiln, and allowed to cool gradually. "These hollow bars or tubes may be employed either singly or in a series of connected bars or tubes covering any required surface, or they may be employed in layers fitting one upon another, and merely separated by loose sand or shingle, so as to allow the water to percolate freely alike on all the sides of the triangular bars or tubes." When employed singly, the ends

of the tube are fitted with stops or plates, one of which is provided with a pipe to carry off the filtered water after it has percolated through the sides of the tube. "When employed in combination for filtering large quantities of water," any number of the tubes may be joined together to form continuous lengths, which are placed side by side, or laid in layers. "In both of the latter arrangements the filtered water is discharged from the inside of the bars or tubes into a convenient receptacle or reservoir provided for the purpose.

[Printed, 6d. Drawing.]

A.D. 1861, September 18.—No. 2323.

WHITE, GEORGE.—(*A communication from Jean Antoine Victor Burq.*)—"Improvements in apparatus for filtering or purifying water or other liquids."

This invention consists in using for filtering purposes thin slabs of porous vegetable, animal, or mineral substances. These slabs are connected by framework and placed edgewise, so that each filtering partition acts independently of the other. "The said frames or grates are held together so as to constitute a strong casing for each apparatus, and make this latter form a polyhedral vessel, presenting a large amount of filtering surface comparatively to its bulk, the outside or casing of each apparatus offering either an open or a closed surface with suitable exit openings for the filtered liquid, according as required."

[Printed, 8d. Drawing.]

A.D. 1861, October 2.—No. 2451.

BISHOP, ALBERT DEMERIT.—(*Provisional protection only.*)—"Improvements in pumps."

Into a vacuum chamber "I pass a pipe which leads down into the well. I also either place a pipe down into the vacuum chamber or lead a pipe from the chamber to the pump, and with the pump I remove the liquid from the vacuum chamber, thereby producing a vacuum in the chamber which causes the liquid to rise from the well" "and in order to filter the liquid I form a separate compartment in the vacuum chamber, and from that chamber I pass the liquid through the pumps, having been filtered through the com-

“partment in the vacuum chamber; and I pass the mud or
“sediment down into a receiver below the vacuum chamber,
“and by means of cocks or valves I discharge the mud or
“sediment from the mud vessel.”

[Printed, 4d. No Drawings.]

A.D. 1861, October 7.—No. 2499.

CHAPLIN, ALEXANDER. — “Improved combined winding
“engine, boiler, and cooking and distilling apparatus, in-
“cluding improvements also applicable separately.”

The “apparatus for distilling fresh from salt water for
“ships’ use” is as follows:—The steam from a boiler enters
by a pipe into a worm enclosed in a vessel into which sea water
is introduced by means of a pipe which descends to the
bottom. The lower part of the descending pipe is perforated
for the water to issue therefrom; thence a current of water
passes upwards to an outlet in a direction opposite to that of
the steam being condensed. The fresh or condensed water is
drawn off by a tap, and is passed through a suitable filter to
render it fit for use.

One or more condensing tanks or vessels may be used.

[Printed, 7d. Drawing.]

A.D. 1861, November 9.—No 2824.

CLARK, WILLIAM.—(*A communication from Jules Pacôme,
Alfred Havard, and Jean Baptiste Bourgoise.*)—“Improve-
“ments in portable and other filters.”

This improved filtering apparatus is formed of two reservoirs
of cloth coated with india-rubber, separated by a filtering sub-
stance contained between two metallic plates pierced with
holes. These reservoirs being flexible, may be folded up so
as to occupy little space when travelling. In order to cleanse
this filter it is sufficient to blow through the suction pipe.
This water filtering apparatus is portable, applicable for the
army service and also for domestic purposes.

If galvanised iron be substituted for the india-rubber fabric
forming the case of the above-described apparatus, this inven-
tion may be used for filtering water on a large scale.

[Printed, 10d. Drawing.]

1862.

A.D. 1862, March 18.—No. 746.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication from Joseph Weatherby Bartlett.*)—"An improved combination of cooling and filtering apparatus, forming a safe for the preservation of solid and liquid provisions."

This apparatus consists of a stand whereon is mounted a shelf turning over on a pivot, a double-walled ice and water case covered in by a lid, a box for ice and water, "a filter composed of any suitable material and connected with the ice box in such a manner as to be removed, cleaned, and replaced at will," a chamber for provisions, movable shelves, and a double-walled door. No further information is given respecting the filtering apparatus. Around the provision chamber is a space for water, and there is a stop-cock through which liquid can be drawn off.

[Printed, 8d. Drawing.]

A.D. 1862, April 1.—No. 921.

LORENZ, HERRMANN, and VETTE, THEODOR.—(*Provisional protection only.*)—"Improvements in filters."

Charcoal or other porous substance is formed into hollow spheres or shells. "The hollow ball or other hollow body is fitted with a socket, into which the short end of a syphon pipe is screwed or otherwise secured, which communicates with the hollow space or other object. When thus fitted with the syphon the said ball constitutes a complete and independent filtering apparatus which can be applied to any vessel or holder of liquid, and put into immediate operation by the immersion of the ball in the liquid." The second part consists in filling the hollow space in these filters "with loose particles of prepared animal or vegetable charcoal." The third part consists in dispensing with the syphons, and causing water to flow through the filters under pressure.

[Printed, 4d. No Drawings.]

A.D. 1862, April 26.—No. 1231.

CHEAVIN, SQUIER, and CHEAVIN, GEORGE.—“Improvements in filtering and purifying water, and in apparatus employed therein.”

The present invention has relation to that set forth in No. 2820, A.D. 1853. “The filter, as there described, has a bowl or vase at the top;” “according to our present invention, we do not employ this bowl, but in place thereof we carry up the body of the filter” “higher than before, and the upper part thereof we employ in place of the bowl, this portion being divided off by a partition, through which passes the small perforated cylinder employed as before, to contain sponge or similar material. Around this small cylinder we pack the filtering or purifying material, with which the water comes first in contact, and below this there is, as before, another bed of filtering material, contained between two perforated plates.” “In order to cleanse the filter from time to time, when it is not necessary to change the filtering materials, we introduce a plunger or piston into the inner perforated cylinder, and work it up and down as a pump.” “The purifying water by causing it to percolate through granulated and washed pit coal is an important feature of our invention.”

[Printed, 6d. Drawing.]

A.D. 1862, July 14.—No. 2023.

CANONICAT, PAUL ANTOINE LUCIEN.—“Improvements in filtering water, and in apparatus employed therein.”

This invention consists in:—

“First, filtering water by ascension by means of basins and filtering vessels.”

“Second, the employment of filtering agents, increasing in fineness as the filtering proceeds.”

“Third, the employment of filtering apparatus set at the apertures to the pipes for conveying the water from one basin to another.”

The drawings show this filter applied on a large scale, the water being taken from a river, for instance, and led by pipes into basins. Sponges in frames constitute the filtering medium.

[Printed, 8d. Drawing.]

A.D. 1862, August 5.—No. 2199.

CLARK, WILLIAM. — (*A communication from Maurice Laschi.*)—"Improvements in the purification of water, and in "apparatus employed therein."

The inventor purifies calcareous water by means of lime. The action of the addition of lime, in proper proportions to the water to be purified, is to unite with the carbonic acid which forms the insoluble earthy carbonates into soluble earthy bicarbonates, and thereby to precipitate the said earths as insoluble carbonates.

A "hydro-calimeter," is used to ascertain the proportions of lime necessary for the purification of different calcareous waters. This title appears to be applied to the following apparatus and ingredients as a whole :—A bottle to receive the water to be tried. A bottle containing milk of lime, in which each $\frac{1}{30}$ th of a cubic inch contains $1\frac{1}{2}$ grains of lime. A glass tube to estimate the exact quantity of lime to saturate the carbonic acid in the water to be tried. Distilled water for the preparation of the milk of lime. A bottle containing lime water. Two tubes indicating "more" and "less." A glass mortar, a small funnel, and a balance."

A certain proportion of lime water being added to the water to be tried according to its behaviour in the two tubes marked "more" and "less" respectively (each tube containing known quantities of lime water), the test is either recommenced or left in its original state, or has more lime water of a known amount added to it.

When this process is applied to large quantities of water, the precipitated carbonate of lime is converted into lime for saturating the carbonic acid, as explained above.

[Printed, 6d. No Drawings.]

A.D. 1862, October 7.—No. 2713.

NEWTON, ALFRED VINCENT. — (*A communication from Francis Bowes Stevens.*)—"Improvements in the construction of condensers or coolers."

1st. "Forming a surface condenser or cooler on the outside "submerged surface of a steamer by placing there one or "more thin and flat tubular passages for containing the steam "to be condensed, or water to be cooled, and having between

“ them spaces for a lamina of the water in which the steamer floats.”

2nd. “So arranging the tubular passages of condensers or coolers that each passage has its own separate port of entry and of exit.”

3rd. “Forming a surface condenser or cooler by a system of headers, elbows, and horizontal tubes placed on the submerged surface of a steamer.”

4th. “The use of a guard enclosing the surface condenser or cooler placed on the outside submerged surface of the vessel.”

5th. “Closing the ports of exit and entrance of the condenser or cooler on the submerged surface of a steamer and attaching pipes leading to the boiler and to the atmosphere.”

The object of the last improvement is to disconnect the condenser or cooler from the engine and allow it to be used for the purpose of distilling fresh water from the sea water.

[Printed, 2s. Drawings.]

A.D. 1862, October 23.—No. 2853.

CHAPLIN, ALEXANDER, and RUSSELL, GEORGE.—“Improvements in obtaining fresh water by evaporation, and in apparatus therefor.”

The object of this invention is to obtain fresh aerated drinking water, from sea or other water, by evaporation and condensation.

This invention consists “in employing what may be termed the ‘jet’ action of the steam, when passing towards or into the condensing worm or other condenser to draw in and thoroughly intermingle with itself sufficient atmospheric air to combine with the water of condensation.”

The apparatus by which this invention is carried out is called “the distil-aerator;” it “consists of a kind of cup introduced into the pipe conveying the steam to the condenser. The steam pipe end is made to project a short distance through the top of the cup to serve as the jet nozzle, and in the sides of the space round the jet nozzle there are apertures for the admission of atmospheric air. Below the air apertures the cup is crossed by a diaphragm, having concentric with the jet nozzle a nozzle or short tube of some-

“ what larger bore than that of the jet nozzle. The bottom or
 “ opposite end of the cup communicates with the condenser.
 “ The jet of steam issuing from the jet nozzle draws in atmo-
 “ spheric air, and forcibly impels it along with itself through
 “ the larger opening in front of the jet nozzle, and the steam
 “ in condensing combines with the air,” so that the water of
 condensation has the character of aerated fresh spring water.
 This apparatus may be used to impregnate the water with car-
 bonic acid.

The drawings show this instrument applied at the top of a
 condensing worm. A charcoal filter is placed beneath the
 condenser which has an escape pipe for the excess of air.

[Printed, 6*d.* Drawing.]

A.D. 1862, October 27.—No. 2887.

LIPSCOMBE, FREDERICK. — “Improvements in purifying
 “ water.”

This invention “relates to the treatment of vegetable matter
 “ preparatory to its conversion into charcoal for filtering
 “ purposes.”

“The whole or portions of any tree or shrub is or are cut
 “ into small pieces and steeped in a strong solution of caustic
 “ soda or caustic potash, or a combination of the two in any
 “ proportion for several days; the aforesaid pieces are then
 “ taken out of the solution, dried, and converted into charcoal
 “ in well covered crucibles, or otherwise; the charcoal is
 “ afterwards ground and treated in the usual manner; it may
 “ then be used by itself, or in combination with one or more
 “ plates or slabs of porous stone, or with ordinary charcoal,
 “ or in combination with one or more of the materials used by
 “ filter makers as filtering media for impure water to pass
 “ through.”

[Printed, 4*d.* No Drawings.]

A.D. 1862, October 31.—No. 2950.

SICKELS, FREDERICK ELSWORTH.—“Improvements in the
 “ means of steering, and manœuvring ships or boats, and in
 “ the apparatus connected therewith, which apparatus is also
 “ applicable for pumping and lifting weights.”

In one part of this invention a surface condenser is combined
 “ with a steering engine so as to condense the steam used in

“steering the vessel to be preserved as fresh water at sea for the ship’s company.”

The surface condenser “may be of any of the ordinary constructions, receiving its cooling water from the outside of the vessel at the bottom, and returning the heated water to the sea at the top, the circulation being maintained by the operation of heating the water, the tubes receiving the steam being enclosed within the condenser.” “The condensed water can be drawn into tanks.”

“If a separate boiler is used to furnish the steam, greater cleanliness can be obtained in the condensed water, and the necessity of taking a large supply of condensed water to sea on long voyages in some measure avoided, more especially if intending to rely wholly or partially on sails.”

[Printed, 3s. 6d. Drawings.]

1863.

A.D. 1863, June 13.—No. 1479.

WRIGLEY, THOMAS.—“Improvements in machinery or apparatus for filtering or cleansing water or other fluids.”

“The peculiar feature of this invention consists in placing in a water-tight vessel a cylinder having a nozzle fitted against a washer so as to form a joint which can be readily tightened or loosened by means of a screw, so that when the joint is tight the fluid may be filtered and pass to the exterior of the vessel, and when loosened the cylinder may be cleaned by centrifugal action.”

[Printed, 10d. Drawing.]

A.D. 1863, July 4.—No. 1670.

OXLEY, JAMES.—“Improvements in filtering apparatus.”

“Filtering bags or cloths are placed in frames, each bag or cloth being by preference between two sheets of wire cloth, which may be fixed in frames, or made suitable to fit into the frames. Two or more of such frames with their filter bags or cloths are used in each apparatus, in such manner that one of the edges of one frame comes next and butts

“against the edge of another frame.” “The frames and the wirework used with them may be flat, or they may be of a bent or curved form, according to the form of the apparatus within which they are placed when being used.” “An apparatus of a circular or of a rectangular section is preferred.” “Any number of these apparatus may be connected to a supply pipe by suitable branches, one to each frame, and the supply pipe may be connected with a force pump, or to apparatus wherein compressed air is used to force liquids into filters, or the supply of liquids to the filters may be otherwise provided for.”

[Printed, 10d. Drawing.]

A.D. 1863, July 21.—No. 1820.

DANCHELL, FREDERICK LUDWIG HAHN.—“Improvements in apparatus for purifying water.”

In place of arresting the impurities in water by passing it through very fine porous material, it is proposed to employ as a filter a vessel entirely filled with such a filtering medium as animal or bone charcoal coarsely granulated. A tap regulates the speed with which the water flows through the filter. The second part of the invention consists of constructing an apparatus for employing an admixture of caustic lime in order to precipitate the bicarbonate of lime contained in the water; the mixing of these ingredients with water takes place in a vessel “which is connected with another at the bottom, so as to admit the said water to pass from the one into the other, thereby causing the pure water to ascend, leaving the heavy matter as a precipitate at the bottom.” The following are the claims with regard to carrying out this invention:—1st. “The application of a screw, tap, or other convenient means to contract or enlarge the passage of the water either to or from the filter, thereby to regulate the speed with which the water is to flow through the filtering medium.” 2nd. “The construction of an apparatus” “to facilitate and speed the precipitation of matters previously held in solution in the water.” 3rd. “The application of these two means of purifying water used in combination.”

No. 1712, A.D. 1860 is referred to in this Specification.

[Printed, 1s. 4d. Drawings.]

A.D. 1863, August 22.—No. 2087.

MARTIN, LOUIS EMILE CONSTANT. — "Improvements in
" apparatus for heating and purifying water."

Vertical tubes pass through a cylindrical vessel, so that the products of combustion rise up through the said tubes. On the interior of the vessel are perforated shelves, all connected so that they may be drawn out together to be cleaned and a fresh set of shelves inserted.

The feed water is continuously supplied, at the top of the purifying vessel, by means of a self-acting apparatus, and is allowed to descend from shelf to shelf by means of numerous small orifices. The shelves being heated, cause all the salts that are in solution, as well as all foreign matter held in suspension in the water to be deposited thereon; the deposit is removed from time to time.

"At the bottom of the vessel a bed of filtering material is placed," for the water to pass through before it leaves the vessel.

In some cases, the above described apparatus is connected with a steam boiler.

"In some cases chloride of barium is mixed in small quantities with the water, in order to facilitate the deposit of the calcareous or other salts in solution, and foreign matter in suspension on the heated shelves."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, September 1.—No. 2158.

RUSSELL, GEORGE. — "Improvements in apparatus for cooking and for obtaining fresh water for use on shipboard and otherwise."

In the apparatus embodying these improvements, a rectangular casing comprises one or more ovens with a hot-plate and other cooking appliances. At or near one end of this casing, a furnace communicates with flues for heating the cooking appliances, and with flues which pass through a steam boiler, separate dampers being adapted to these flues. The ash-pit of the furnace is fitted with one or more partitions, and with doors to each compartment to regulate the admission of air. The horizontal cylindrical boiler has horizontal flue tubes, "the fire gases passing through one or more of these in one direction,

" and returning through another or others of them to a casing
 " in the centre of the combined apparatus, by which casing
 " the fire gases from both the cooking details and boiler pass
 " to the chimney." A water space beneath the flues provides
 for the deposition of salt, and the salt may be blown off or removed by means of a door. The boiler may be used to raise steam for the obtainment of fresh water. The condenser is fitted with pipes for admitting air to mingle with the condensing steam, and thus accomplishes the aeration of the water of condensation; or the condenser may be fitted with self-acting valves to admit thereto atmospheric air whenever the internal pressure is less than that of the atmosphere. The exhaust steam from a donkey engine, worked by the boiler, may be delivered into a receiver, or condensed in a separate and distinct condenser, "the object in either case being to condense
 " all the steam generated in the boiler."

[Printed, 10d. Drawing.]

A.D. 1863, October 20.—No. 2566.

SNELL, WILLIAM.—(*A communication from George Wagstaff Yapp.*)—"Improvements in surface condensers for steam
 " and other vapours."

According to this invention, "tubes, trunks, cases, or other
 " vessels" are used as condensers "when filled with an
 " assemblage of conducting surfaces, such as wire gauze,
 " perforated metal plates, bundles of wire or rods, nails,
 " metallic shot, metal borings or turnings, &c." These are so
 arranged in the tubes as to afford sufficient interstitial space
 for the passage of the vapours and the escape of the resulting
 condensed liquids.

A steam jet, issuing from a pipe inside a hollow cone, is
 used to purge the condenser of air.

To clear the refrigerator of the mud and sludge deposited by
 the water, a branch pipe (from a standard pipe in connection
 with the bottom of the refrigerator), after rising some short
 distance, bends over to form a spout. A screw-valve connects
 the stand pipe with the branch pipe, and when this valve is
 open, the sludge, in endeavouring to reach the level of the
 water outside the ship, rushes up the standard pipe and out at
 the spout.

A double-chambered pump is employed to remove the vapour which rises in the cistern of the condenser.

To show that the flow of water in or out of the refrigerator is not obstructed, the velocity of the inflowing water is shown by rotating vanes in connection with differential gear and a revolving disc.

Amongst other uses, this condenser is applicable to "the distillation of sea water for drinking purposes."

[Printed, 1s. 4d. Drawings.]

A.D. 1863, November 16.—No. 2874.

HARRISON, CHARLES WEIGHTMAN. — "Improvements in filters."

"I construct my filters of a cylindrical or other shaped cage, closed at bottom and at top by a moveable cover. The cage itself is formed of wire cloth or perforated metal, and encloses within it another openwork cylinder; inside this cylinder, and in the centre of the filter, is a perforated pipe leading into a solid pipe passing through the bottom of the filter, from which the filtered liquid is taken. The space between the two openwork cylinders is packed with "coarse filtering material," "while the space between the inner cylinder and the perforated pipe for receiving the filtered liquid is filled with" "carbonaceous matter. A cover in the form of an air vessel is applied on the cylinders to give the filters sufficient buoyancy to float at or just below the surface of the liquid."

Two other parts of this invention are, first, forming filtering beds of asbestos, talc, or similar material combined with mineralized wool, sponge, or carbon; second, adapting magnets to filters. These are placed in any convenient position for acting upon or polarising the oxygen in the water or other liquid to be purified.

[Printed, 6d. Drawing.]

A.D. 1863, November 30.—No. 3002.

OLLIS, JOHN MATTHIAS.—(*Provisional protection only.*)—

"Improvements in apparatus for obtaining fresh water from sea water."

1st. The construction and employment of a self-acting valve in surface condensers for distilling sea water. "This valve

“ regulates the supply of steam, and retains within the condenser the distilled water until it becomes cold.” The condenser is composed of upright tubes, and its cistern has sea water flowing freely through it. The steam pressure tends to open the valve, but a float, is connected with the said valve, by a rod and lever, which does not allow the valve to open wide until the condenser is half full of distilled water.

2nd. “ The employment of a refrigerator, in which the distilled water is made to condense the vapour of the water “ used for condensing the steam.” The refrigerator is fixed high above the condenser, and “ the distilled water is forced “ up into the refrigerator by the pressure of the steam “ within the condenser.” The pressure increases as the distilled water accumulates in the condenser, and when the valve opens wide, the steam pressure forces a stream of water into the refrigerator. A pipe conveys the vapour of the sea water that has been used for condensing the steam into the side of the refrigerator, and the distilled water, discharged into the top of the refrigerator, filtering through certain divisions in its passage “ condenses the vapour of the sea water, and falls into “ the receiving tank.”

[Printed, 4d. No Drawings.]

A.D. 1863, December 14.—No. 3156.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Auguste Cardinal, junior.*)—(*Provisional protection only.*)—

“ Improvements in ship's cooking and distilling apparatus.”

“ This invention consists in constructing apparatus for “ cooking, and at the same time distilling salt water and “ obtaining fresh water therefrom, entirely of iron.”

The drawings show a rectangular case containing a fire-place, ash-pit, bridge, partition to enable the hot gases to circulate round the oven and enter the rectangular case under the boilers, damper, and reservoir or case for the cooking utensils. The condenser is not shown, but its upper part furnishes water for feeding the boiler. Apparently, the steam is taken from a cap at the back of the apparatus and conducted to the refrigerator. The chimney is also at the back, and the products of combustion take a circuitous path from the fire-place to the chimney. The boiler containing the salt water for distilling appears to surround the cooking appliances.

as a casing. A cock admits the salt water (warmed by the absorption of heat) from the refrigerator or condenser to the boiler. "The fire being lighted, distillation as well as cooking "commence;" the product from the distillation of the sea water from the boiler rises through tubes into the cap, and from thence through a pipe into the condenser.

[Printed, 1s. Drawings.]

1864.

A.D. 1864, February 5.—No. 307.

OWEN, ROBERT.—"Improvements in apparatus for filtering "water and other liquids."

These improvements are :—1st, the use of felt, either alone or in combination with woollen fabrics, and placed in layers on a perforated plate, or wrapped round a perforated cylinder, or reel, or the felt may be made into a bag to contain granulated carbon through which the water is passed; 2nd, arranging circular toothed wheels for lifting or forcing the water through the filtering agents, and two modes of fastening on the lids of the filters; 3rd, using the cylinders of different diameters, and working the one inside the other, the outside one to serve as a reservoir for holding the water to be filtered, and the inner one to act as a plunger to force the water into its interior; 4th, employing graduated taps, whereby the water is let gradually into the filter, and dirty water is let off without removing the filter; 5th, employing in a washing apparatus a perforated cylinder and compound springs, also, perforated cylinders wherein pistons act as plungers to assist in cleaning the felt and other filtering agents.

[Printed, 1s. 6d. Drawings.]

A.D. 1864, February 11.—No. 364.

SLACK, JAMES. — (*Provisional protection only.*) — "Im-
"provements in filters and filtering media for filtering marine
"and other water or condensed steam, and the application of
"the said filters and filtering media to marine engine and
"other condensers."

A vessel of any suitable form is divided by a partition into two compartments; on one side is placed filtering media, the other compartment forms the pure water chamber. "I first fix inside the tank in the filter compartment, a little distance from the bottom, a perforated plate, upon which I place a thin lamina of coarse gravel, sand, or ground glass; over this a layer of fine sand well washed and beaten down, then a thickness of furnace coke ground very fine, also beaten down until it becomes tolerably solid. I next put in a layer of fine vegetable or animal charcoal, well beaten down; over this I place another layer of finely ground furnace coke, beaten down again; on the top of this I place a layer of gravel, coarse sand, or ground glass, and to bind and keep the filtering strata compactly together, I put over all another finely perforated plate, which I secure by bolts or cement. Marine or other water may be admitted at the top or bottom of the filter, when it will percolate through the filtering media, and can be drawn off by a tap, or conveyed from an overflow to tanks or reservoirs to receive it."

[Printed, 4d. No Drawings.]

A.D. 1864, February 12.—No. 370.

WINSTANLEY, WILLIAM, and KELLY, JOSEPH.—"Improvements in steam apparatus for ships' use, part of which improvements is applicable to other purposes."

A portion of this invention relates to an "improved evaporator or regenerative still for producing pure sparkling fresh water from sea water or foul water," and it consists of:—

1st. "Boiling off a large portion of the water of condensation, converting it into steam at a lower temperature than that boiling out, and causing the steam so evaporated to pass into the condensing tubes along with the original steam from the main boiler."

2nd. "Keeping sea water in evaporating part of condenser at a uniform height," and clearing out the brine without manual attention.

3rd. Preventing the priming of the water.

4th. Producing a larger quantity of water than usual, and aerating, boiling, and condensing the water in the same cylinder.

5th. A new method of filtering.

In the hollow base of the apparatus, the filtering materials are placed; on this the above-mentioned cylinder stands, having a worm or coil within it. A modification of Giffard's injector is attached to the outside of the cylinder. This is directly connected with the steam pipe from the boiler, and has inlets to it from the upper part of the case; the action of this arrangement is to form a vacuum on the surface of the water of condensation in the cylinder and to cause it to liberate its steam at a low temperature. At the same time this steam is drawn off into the worm of the condenser and the water in the cylinder is ensured from priming. The filtering compartment is rectangular, opening at one side, so that the filter can be drawn out without breaking joint. In the filter, the lowest layer is of gravel or ground glass, the next is river sand, then (in order) furnace coke, charcoal, furnace coke, and gravel or ground glass.

[Printed, 1s. 10d. Drawings.]

A.D. 1864, February 25.—No. 472.

RIVIER, JEAN FRANÇOIS.—“An improved system for filtering and purifying liquids, with an endless spouting capillary filter.”

“The filtering and purifying materials used, and through which the water is caused to run by the sole pressure of an upper liquid column, are firstly, a thick capillary filter, such as felt made from flock, cow or camel hair,” “then several combined layers of the following filtering materials, sponges prepared with iodine, charcoal, sandstones, iron scraps and sand. My filtering apparatuses are so arranged that all unclean and muddy particles mixed with the water are intercepted, and the water runs out as clear as crystal without interruption, and as quickly as it flows in. The detritus of organic materials or any other filthiness which may be mixed with water as it passes into the filter are stopped by the filtering materials; they are arrested by the permeable under side of the filter, and fall down to the bottom of the mud channel or chamber, whence they are scraped off once in a while by brushes suitably disposed for this purpose in the said channel, or even by the sole pressure of the upper column by merely opening the discharge cock.”

The drawings show the following adaptations of this invention :—1st. A large filter for supplying a town and composed of several adjoining chambers. 2nd. A domestic filter. 3rd. A kerbstone fountain. 4th. A portable filter for military purposes.

[Printed, 10d. Drawing.]

A.D. 1864, February 26.—No. 482.

PRINCE, ALEXANDER.—(*A communication from François Michel and Aimé Puvot.*)—"Improvements in filtering apparatus."

The improved filter consists of a vessel "containing two layers provided with filtering matters, which are separated into two basins, the lower one destined to receive the water to be filtered, the upper one containing the clarified liquid." "A cistern is situated above the level of the cylinder containing the water to be filtered, and conveying it by a syphon tube into the lower basin of the cylinder. In obedience to the law of equilibrium of liquids, the water rises in the lower basin, passing through the filtering layers, where it is completely purified."

To clean the apparatus, the supply pipe is closed ; the waste water being allowed to run out, water from the reservoir, through roses, is made to wash away all impurities. In one modification this filter may be used for military purposes. In another modification, it may be used as an ordinary drinking fountain.

[Printed, 10d. Drawing.]

A.D. 1864, March 19.—No. 699.

HEYWOOD, CHARLES.—A "method and means of removing 'scum' or floating particles from the surface of water or other liquids."

This invention "is particularly applicable to baths, basins, cisterns, boilers, or other vessels of capacity for containing liquids wherein 'scum' arises or falls from the atmosphere."

"The improvement consists in floating off the 'scum' by means of a superficial stream or current of liquid, so directed as to pass over the surface and carry away the floating 'scum.' This is to be effected by forming a long slot or

“ opening, or series of openings, at one side of the vessel
 “ opposite to and level with the liquid supply aperture ; such
 “ long slot is intended to form an overflow for the liquid, and
 “ may be placed at any required height, and may communicate
 “ either with the waste or general outlet, or have a separate
 “ discharge pipe. To remove any ‘scum’ or impurities float-
 “ ing on the surface of water, say, for example, in a bath, it
 “ would simply be requisite to admit pure water on one side
 “ of the bath at the level of the surface, which would cause a
 “ sheet or stream of water to pass across to the outlet which
 “ would carry with it and remove all floating particles, and
 “ leave the surface clean.”

The drawings show “a domestic bath” with the aforesaid improvements applied to it.

[Printed, *8d.* Drawing.]

A.D. 1864, July 7.—No. 1688.

NEWTON, WILLIAM EDWARD. — (*A communication from Carl Johann Auguste Scheerer.*)—“An improved process for
 “ cleansing and clarifying impure water.”

The chemical agent it is proposed to employ to effect this
 “ object is a solution of the neutral ” sulphate “ of peroxide of
 “ iron ($\text{Fe}_2\text{O}_3 + 3\text{SO}_3$), which is to be added in a very diluted
 “ state to the water intended to be operated upon.” “A short
 “ time after the neutral sulphate is added to the impure water
 “ it becomes decomposed, and forms, with some of the
 “ impurities contained in the water, a basic salt, which is
 “ insoluble in water. The solid and insoluble particles of
 “ this new salt are precipitated, and, together with the
 “ impurities contained in the water, form a sedimentary
 “ deposit from which the purified water may be allowed to run
 “ off, leaving behind the sedimentary deposit in the tank or
 “ reservoir.”

[Printed, *4d.* No Drawings.]

A.D. 1864, July 19.—No. 1799.

ESPIRAT, ANTOINE, and SAUSE, ETIENNE.—“An improved
 “ filter.”

The water to be filtered first enters a float box and raises the
 float, thereby making a passage for itself into “the receiver of
 “ the cleanser.” By means of upward pressure, it then passes

through filtering materials held between gratings. Freed from the grosser impurities, it now passes into a second float box, where it raises the float and passes up a pipe into another receiver; thence passing through filtering materials held between gratings, it is thoroughly purified and may be conducted where desired for use.

When the filtering materials are choked with muddy matters, a counterweight slides on a guide, draws down a lever, and thus opens a valve; then the outflow and cleansing takes place. The movement of the counterweight may be effected by the falling of the overflow on to an overshot water wheel.

[Printed, 1s. Drawings.]

A.D. 1864, August 13.—No. 2018.

ANDRIES, EDOUARD.—“Improvements in means or apparatus
“ for purifying every kind of water and rendering it drinkable,
“ and for rendering sea-water fresh and drinkable.”

1st. A mode of purifying or filtering water by “causing it
“ to pass through parallel, vertical, and horizontal layers of
“ different filtering materials to a chamber in the middle
“ of the filter, from which it is drawn off in a purified state by
“ suitable means.”

2nd. The construction and arrangement of the parts of filtering apparatus, namely, “enclosing parallel layers of filtering materials between two perforated metallic chests or cases
“ lined with linen or other fibrous material, the inner chest
“ forming an inside chamber containing the end of the pipe,
“ through which the water is drawn off in a purified state
“ for use.”

The drawings show a perforated chest placed in a well, but it may be placed “in sea or other water.” The layers of “filtering material (ranging from interior to exterior) are:—Carbonized bone, charcoal, coarse sand, and coal. At the bottom of the exit pipe, above the perforations therein, a sponge is fitted; this sponge deprives the water “of any
“ impurities which might have found their way into the inner
“ chest.”

The apparatus which forms the subject of this invention may be made portable for military purposes, or it may be applied to ships, boats, rivers, canals, or ponds.

[Printed, 10d. Drawing.]

A.D. 1864, September 6.—No. 2178.

BAKER, THOMAS HENRY, and WOODROFFE, THOMAS.—
 “Improvements in apparatus for filtering water and other
 “liquids.”

According to one modification, a chamber is employed divided into two parts by an inclined partition extending from the upper to near the lower part, where the filtering medium is suspended between perforated plates. The water to be filtered rises through the filtering medium into the compartment formed by the inclined partition, whence it may be drawn off. In another modification a closed chamber is divided into two compartments by perforated plates, between which is the filtering medium. In the lower one is the unfiltered water, supplied by an upper reservoir. The outlet from the lower compartment, from which unfiltered water may be drawn, admits of the return of the filtered water through the filtering medium for cleansing purposes. “We
 “also apply an air vent to the compartment for the filtered
 “fluid formed by a syphon tube, one end of which opens into
 “that compartment, where it is capable of being closed by a
 “valve and float acted upon by the rising of the fluid therein;
 “the other end of this pipe dips into a small external vessel
 “of fluid.”

[Printed, 1s. 2d. Drawings.]

A.D. 1864, September 26.—No. 2354.

WHEELER, GEORGE PRINTY, and GLOYN, JOHN FOX.—
 “Improvements in the preparation and application of certain
 “materials for the purpose of cleaning and polishing the
 “surfaces of metals, which are also applicable to other
 “purposes.”

The slag, dross, or cinder produced from the smelting of iron, copper, and silver, is subjected “to a suitable action
 “of crushing, grinding, or pulverizing by any suitable ma-
 “chinery or apparatus,” and, when it is sufficiently crushed
 or pulverized, it is sifted into suitable degrees of fineness
 “to suit the various purposes to which it is to be applied.”

Amongst the purposes to which the above-mentioned material, prepared as herein-before set forth is applicable, is “to

“ filtering machines, as it makes an excellent filtering medium
 “ and will supersede the use of charcoal, felt, and similar
 “ articles used for filtering water and other liquids.”

[Printed, 4d. No Drawings.]

A.D. 1864, November 7.—No. 2757.

SLACK, JAMES.—(*Provisional protection only.*)—“ Im-
 “ provements in filters and filtering apparatus.”

“ The vessel which forms the filter case is closed at one end,
 “ and fitted with a water-tight closing cover at the other, or it
 “ may be a pipe or cylinder open at each end, having two
 “ water-tight closing covers. In the centre of this vessel I
 “ place the filtering material, which is held in position by a
 “ perforated plate fixed above and below it, leaving spaces
 “ between the said perforated plates and the ends or covers
 “ for the water. Each chamber of the filter or filtering ap-
 “ paratus thus formed is fitted with an inlet tap and junction
 “ collar, so that the water from the main can be admitted to
 “ both chambers alternately. Both chambers are also fitted
 “ with draw-off taps, through which filtered and unfiltered
 “ water may be drawn at pleasure.”

The water ascends through the filtering material. The
 reverse flow of the water cleanses the filter.

[Printed, 4d. No Drawings.]

1865.

A.D. 1865, January 28.—No. 249.

BURQ, VICTOR.—“ Improvements in filtering apparatuses.”

These improvements consist in employing, for filtering pur-
 poses, thin plates, slabs, or diaphragms of porous stone or
 other suitable substance. The water or fluid to be filtered is
 either made to pass through a layer of these, or else the plates
 or slabs are formed into chambers, into which the water
 passes, and from which it escapes in a purified state through
 the sides.

By causing the filtration to take place from the opposite side
 of the said slabs to that in which the same had taken place
 before, the cleansing of the said slabs may be accomplished.

The cleansing may be aided by the effect of cleansing brushes, or by the continuous scrubbing of their surfaces by the current of water.

To supply towns with filtered water the above-described apparatus may be immersed in a river or other large body of water.

A disinfecting of the filtered liquid may be accomplished by means of the said apparatus. The apparatus may be kept floating in the liquid to be filtered.

Besides filters and slabs adapted to the above purposes, the drawings show a filter that may be fitted in a boat, also a floating filter in the shape of the cask, a filtering bottle, a tubular filter, a filter for military purposes, and a traveller's filter.

The artificial slabs may be composed of clay, wood dust, animal charcoal, tar, "or other suitable agglomerating material." After being moulded, they are baked in air-tight vessels.

[Printed, 1s. 6d. Drawings.]

A.D. 1865, February 18.—No. 467.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Gabriel Planche.*)—(*Provisional protection only.*)—"Improvements in filters."

This invention relates to filtering large bodies of water, and consists in constructing a reservoir between the supply and the main filtering basin, from which it is separated by a partition. In the partition are sluices, and at the bottom is a channel closed by a valve. The filtering basin is formed with sides sloping towards the bottom of the filter beds, which consist of a top layer of stones, under this is a layer of sand, below that small gravel, then coarse gravel, then a layer of stones or pebbles, and under that rough stone slabs not joined, or perforated plates, to allow the water to pass through into the space provided at the bottom of the filtering basin; a conduit leads the filtered water into the reservoirs, whence it is drawn off by a pump or otherwise.

The cleansing of this filter is accomplished by the flowing up of the water through the filter beds, also by means of a stirrer, the remaining impurities being carried off by the current.

[Printed, 4d. No Drawings.]

A.D. 1865, April 7.—No. 995.

EDMONDS, HENRY. — “Improvements in apparatus for
“ lighting and ventilating ships, part of which is also applic-
“ able for producing fresh water at sea.”

1st. A tubular apparatus, that extends round or partly round the sides of the cabin decks of a ship, receives the vapours of certain lights or lanterns; to carry off these vapours, the side tubes of the tubular apparatus are in direct communication with one or more up draft ventilators.

2nd. Into the up draft tube ventilator is inserted “a steam
“ condensing vessel supplied by a pipe with steam from a
“ boiler;” air passages pass through the said condensing vessel, occupying the greater part of its cubical contents. The condenser is thereby cooled, and the condensed steam (in the form of fresh water) is abstracted from the apparatus by means of a lower exit pipe.

3rd. “The motion of the air through the heated air passages
“ for ventilation and for the increased condensation of steam
“ may be accelerated by the use of a fan or other air forcing
“ means, such as by directing a number of minute steam jets
“ up the ventilator.”

4th. For lighting in connection with this apparatus, a hydro-carbon lamp is preferred.

[Printed, 8d. Drawing.]

A.D. 1865, May 3.—No. 1242.

LENK, CARL GUSTAV.—(*Provisional protection only.*)—“An
“ improved process for purifying water.”

“It consists of a mixture of hypermanganate of potash,
“ carbonate of soda, alum, and neutralized aluminite, which,
“ on being added to the water, precipitates all organic and
“ inorganic impurities, and renders it clear and wholesome.
“ The water can then be drawn off, and if a tap is used it
“ should be fitted with a tube projecting towards the middle
“ of the vessel, the end being slightly raised from the bottom
“ of the vessel to prevent the precipitated impurities being
“ drawn off with the purified water.”

[Printed, 4d. No Drawings.]

A.D. 1865, September 21.—No. 2415.

BIRD, ALFRED.—“Improvements in purifying water.”

“I make a solution in water of sulphate of alumina, otherwise called sesqui-sulphate of aluminium. I prefer to make the said solution of the strength of ten ounces in the imperial pint. I add this solution of sulphate of alumina to the water to be purified in the proportion of about one ounce of the said solution to twenty gallons of the said water to be purified. I mix the solution well with the water, and allow the water to remain undisturbed for from twelve to twenty-four hours. Soon after the addition of the sulphate of alumina to the water a flocculent precipitate forms, which gradually subsides, and leaves the water brilliant in appearance, and deprived of a portion of the lime it originally contained, as well as any organic colouring matter with which it may have been contaminated.” “If the water is drawn off too soon after the addition of the sulphate of alumina, some flocculi may remain attached to the sides of the vessel.” “In order to prevent the said flocculi from being drawn off with the clear water I prefer to connect with the upper tap by which the water is drawn off a tube or vessel containing a piece of slightly compressed sponge or cotton wool, by which any flocculi will be arrested; or the flocculi may be strained in any other convenient way.”

[Printed, 4d. No Drawings.]

A.D. 1865, October 13.—No. 2646.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Léandre Danjou.*)—(*Provisional protection only.*)—“An improved liquid compound for purifying sea and other waters.”

“This invention consists of a liquid compound for purifying sea, ferruginous, and other waters, so that when used for feeding boilers incrustation may be prevented, and when for washing, scouring, and cleaning their qualities may be improved. The compound is formed thus, in or about the proportions stated:—2 pounds of crystals of soda, 9 ounces of quicklime slaked and pulverized, and 8 pounds of water. Place the crystals of soda, the slacked lime, and the water in a pan and boil for about an hour, then remove the pan

“ from the fire, allow the contents to cool, and draw off the liquid clear.

“ To purify sea water, pour about nine ounces of the liquid compound into about one hundred quarts of sea water, agitate and allow the mixture to settle, then draw off the clear liquid which will be found to be purified.

“ For ferruginous waters, add about seven ounces of the liquid compound to every hundred quarts of ferruginous water.

“ To purify soft water, add from four to five ounces of the compound to every hundred quarts of water.

“ For soft waters the proportion of soda crystals in making the compound may be considerably diminished.”

[Printed, 4d. No Drawings.]

A.D. 1865, October 17.—No. 2674.

LENK, CARL GUSTAV.—“ An improved process for purifying and preserving water.”

“ I dissolve about twelve parts of alum, about thirty-two parts of alumnite (either neutralized or not), about two parts of carbonate of soda, and about one part of solution of iron or of hypermanganate of potash in about two hundred and forty to three hundred parts of water, and pour the mixture into the water to be purified and preserved in the proportion of five to ten drops to the quart of water, according to the degree of its impurity, and all organic and inorganic impurities are precipitated. If the water is for immediate use then alum and alumnite only need be employed, but if it is desired to keep it for any length of time the carbonate of soda, with the solution of iron or hypermanganate of potash, should be added either to the mixture, as above-mentioned, or to the water after it is purified. When the water has been purified it should be drawn off by means of a tube passing into the centre of the vessel, and raised slightly from the bottom, so that no precipitated impurities can be drawn off with the water.”

[Printed, 4d. No Drawings.]

A.D. 1865, November 17.—No. 2953.

HUNTLY, SAMUEL HAZARD.—“ Improvements in apparatus for obtaining fresh water from salt and impure water, also applicable for ventilating purposes.”

1st. "Constructing apparatus for obtaining fresh water from salt or impure water, in which the distilled vapour of water is caused to pass from the distilling apparatus into receptacles, the outer surfaces of which are cooled by currents of atmospheric air so as to condense the water therein."

2nd. An arrangement of apparatus "for obtaining fresh water from salt or impure water, whereby such apparatus is also made to effect the ventilation of ship's cabins and other localities."

The drawings show an annular condenser having the steam pipe entering therein at the top and the exit or distilled water pipe at the bottom. The exit pipe passes into a coil of pipes cooled by flowing sea water and then into a tank whence it may be drawn for use. The annular condenser is placed within a casing which has a trumpet mouth. An exterior casing to that just mentioned has also a trumpet mouth in the opposite direction to the first. Whichever of these casings has its mouth directed towards the wind carries fresh air into the cabin, the other casing carrying away the vitiated air therefrom. When the interior casing carries the fresh air, it (the air) passes through the condenser, when the outer casing carries the fresh air the outside of the condenser is cooled thereby. Valves are placed to regulate the passage of the air through this apparatus or to close the apertures, if necessary.

[Printed, 6d. Drawing.]

A.D. 1865, December 27.—No. 3351.

WHEELER, NORMAN WILLIS.—"Improvements in distilling and in relieving distilled and other liquids from gases mechanically mixed therewith."

One portion of this invention "relates to the use of a static column of water communicating with a reservoir, or with the sea if on ship board, in combination with suitable steam heating surface and automatic discharge in such a way that it will distil pure water from salt, or otherwise impure water without requiring attention or manipulation except at long intervals of time." The column is so placed in the vessel that the level of the sea water is always within it; at its lower part it has a valved entrance for the sea water; and a steam jacket supplies the requisite heat for evaporation. The steam from the steam jacket partially condenses in a steam trap, and

when the water has accumulated there, it (the steam) passes to the exit pipe where its contact with the feed water pipe condenses it. The steam from the column passes along the same exit pipe, but there is a valve to prevent the steam from the steam jacket from entering the column. When this valve is closed and the heat continued, the column may be emptied and thus cleansed.

Another portion of this invention "relates to liberating and discharging whatever unabsorbed air or gas exists in water or other liquids which are being pumped or otherwise forced under pressure."

[Printed, 10d. Drawing.]

1866.

A.D. 1866, January 30.—No. 291.

TONGUE, JOHN GARRETT. — (*A communication from Edouard Patan.*) — (*Provisional protection only.*) — "Improvements in obtaining motive power, either giving or not giving light."

"The summary of the principles which constitute this improved motive power may be thus stated:—

- "1st. To take from the atmosphere air as cold as possible.
- "2nd. To compress it by force pumps into a close space divided by fillets or thin metal plates.
- "3rd. Heating it by the most economical means."
- "4th. Conducting it thus heated, that is to say, expanded, into conducting tubes to one or more working cylinders.
- "5th. Utilizing the heat at its exit (from the cylinders), first, by making it exclusively feed the furnace, that is to say, to make it furnish the quantity of air required by the working and for the proper combustion of the gas, and then in utilizing the rest according to the requirements of the purpose to which it is applied.
- "Thus on board ship it can be made to serve not only to cook the soup for the crew, but also to distil and transform into fresh water a certain quantity of sea water."

[Printed, 1s. Drawings.]

A.D. 1866, February 5.—No. 356.

SPENCER, THOMAS.—“Improvements in the mode of and
“ apparatus for filtering water and other fluids.”

In this filter it is proposed to combine the processes of filtration by ascension and descension. This object is attained by confining the filtering media between a double perforated case. On the outside and towards the bottom of this case the water is admitted, thence it passes up through the layer of filtering media, descending through apertures at the top into the internal part of the case, whence it passes away in a purified state. The particular novelty is claimed to be the covering jacket or covering with a corrugated rim described and illustrated.

[Printed, 1s. Drawings.]

A.D. 1866, February 23.—No. 557.

PARKER, JAMES.—(*Provisional protection only.*)—“Improvements in engines and apparatus for obtaining motive
“ power, and for using the foul air in mines as fuel.”

The portion of this invention which relates to the obtainment of aerated distilled water is the condenser. “The improvements consist in using a condenser having a partial vacuum into which is discharged the exhaust steam and air or moist air from the cylinder, by which means the steam or moisture in the air or a large part of it condenses, and the air previously in combination with the steam cools and contracts considerably, and it is then drawn off from the condenser by steam jets and nozzles similar to those used to drive in the atmospheric air. The aerated condensed water deposited in the condenser may be economically employed in steam vessels to feed the boiler, or be available for the use of the ship’s company instead of the ordinary distilled sea water.”

[Printed, 4d. No Drawings.]

A.D. 1866, March 5.—No. 667.

GRAY, JAMES.—“Improved preparations for acting upon sea
“ water or upon hard or impure water in order to render such
“ water more suitable for use in boilers and otherwise.”

“The fluids are to be composed and prepared substantially

“ in the proportions and manner following :—A two hundred
 “ gallon boiler is filled about half full of water, and there is
 “ added about three hundredweights each of soda ash and
 “ fresh burned lime. The mixture is boiled for one to two
 “ hours, and the clear supernatant liquor is drawn off and
 “ constitutes fluid No. 1, the precipitated matters being thrown
 “ away or treated as herein-after specified. Fluids Nos. 2, 3,
 “ and 4 are made in the same way, but with common soda,
 “ potash, or black ash and pearl ash respectively in place of
 “ soda ash. Fluid No. 5 is also made in the same way, but
 “ with kelp from sea wrack in place of soda ash.”

The precipitated matters obtained in making fluid No. 1, may be utilized by filling up the boiler a second time and boiling.

“ After settling the clear supernatant fluid is carefully filtered
 “ or strained through cloth or other suitable filters.” This
 fluid may be used to correct the hardness of water used for
 making tea and other infusions.

Precipitates from Nos. 2, 3, 4, 5 may be boiled with fresh
 ingredients and the resulting liquids used for washing houses
 and other sanitary purposes.

[Printed, 4d. No Drawings.]

A.D. 1866, April 21,—No. 1134.

WILSON, JOHN HAYS.—“ An improved apparatus for the
 “ distillation of sea-water on board ships, and for heating the
 “ feed-water therefor, parts of which are also applicable to
 “ the heating of any portion of the vessel, or for heating
 “ conservatories and other buildings.”

The first part of this invention refers to “ Wilson’s registered
 “ ship’s galley stove ” as applied to the distillation of sea
 water. A vertical boiler, with a flue, is in connection (by
 means of a suitable pipe) with a condensing worm. The water
 heated by the condensing worm may be used as feed water
 for the boiler. The condenser may be supplied with cold
 water by an elevated cistern, by pumps, or in any other con-
 venient manner. The vertical boiler has lateral water chambers
 forming the sides of the furnace grate, and the products of
 combustion pass through an uptake or flue in the centre of
 the boiler. The said boiler is cast in one piece.

The second part of this invention relates to improvements in a saddle boiler, that may be used alone, or in connection with the first part of this invention, for distilling sea water. This boiler is cast in sections and has a foot and toe-piece forming the bridge of the furnace. Parallel longitudinal flues extend through the boiler over the crown of the furnace; these are cast in one piece with the front plate of the boiler. "It is preferred to construct the improved saddle boiler with hollow fire-grate bars to contain water in communication with the interior of the boiler as is well understood."

[Printed, 10d. Drawing.]

A.D. 1866, April 27.—No. 1180.

TOBIN, THOMAS WILLIAM.—(*Provisional protection only.*)—

"Apparatus for effecting a solution of lime for the purpose of softening hard water."

Two chambers are provided, the first to contain a sufficient supply of lime. An opening at the top of this first chamber admits of the insertion of the lime, and another opening at the bottom allows of the supply of water. Over the latter is placed a covering of wire gauze, "in order to spread the water in the presence of the lime on its entrance into the chamber." The second chamber is air-tight, and contains six cubic inches or more; it is attached to the supply and communicates with the lower aperture in the first chamber; the upper part of the said second chamber contains air and the whole of the water supplying the first chamber is passed through the second chamber. "A mixture of lime with water to about the consistency of thin paste is placed through the upper opening into the first chamber, and there falls by its weight, covering the opening at bottom. The water now entering disturbs and passes through the lime to the top of the chamber, saturated, or nearly so, with lime. The water so obtained may be withdrawn by means of a syphon from below the surface which is ordinarily covered with a scum." This water is then mixed with the water to be softened in the proportions set forth in No. 8875, A.D. 1841, and the whole is filtered through charcoal or other filtering material.

[Printed, 4d. No Drawings.]

A.D. 1866, August 16.—No. 2107.

KÜHNE, ADOLPHE.—(*A communication from Willy Kühne.*)—(*Provisional protection only.*)—"Improvements in the "purification of water, and in the disinfection and preservation of putrescent and putrescible matters."

This invention, "so far as it relates to the disinfection & "purification of water, consists in the employment of an "oxydizing substance, such, for example, as chlorine, or permanganates of the alkaline, or of the alkaline earths," which the inventor "employs in sufficient quantity to destroy any "injurious organic matter or product which may be present "therein and in such cases where an excess of the disinfecting "material has been employed, in neutralizing and destroying "such excess by means of hyposulphite of soda or other deoxidizing re-agent. The proportions of the oxidizing or disinfecting re-agent to be employed will of course be dependent upon "the impurities present, and the amount of the deoxidising "re-agent necessary to be used will be proportionate to the "excess of the oxidizing material employed." In some cases, the before-mentioned permanganates are neutralized or acidified, either when in solution or when mixed with water.

For disinfection a mixture of permanganates and persulphate of iron is incorporated with the materials under treatment.

[Printed, 4d. No Drawings.]

A.D. 1866, August 18.—No. 2125.

MOORE, GEORGE EDWARD.—(*Provisional protection only.*)—"Improvements in apparatus for filtering and purifying "water and other fluids."

This invention consists in attaching to the nozzle of a tap, the spout of a pump, or the outflow of other apparatus, a chamber or reservoir containing charcoal, pumice stone, sand, or other filtering, purifying, or disinfecting media. The filtering chamber hangs by a chain attached to any portion of the tap, and thus cleanses itself by draining.

When the fluid is not required to be purified, the filtering chamber may be displaced; the fluid can then be drawn off rapidly. For the same purpose the filter may be attached to one nozzle of a two-way tap.

According to another plan, the filter may be placed on the pipe behind the tap.

[Printed, 4d. No Drawings.]

A.D. 1866, August 28.—No. 2218.

IRVINE, ROBERT.—“Improvements in treating and purifying
“ water.”

These improvements consist in employing mineral charcoal prepared from shale oil. The materials are ground to powder and placed in the liquid to be purified, or a filter is constructed of these materials, which is so porous as to admit of the passage of the liquid through the bed or beds of filtering media.

When the water to be purified contains solid substances in suspension, it is passed through a filter containing gravel.

[Printed, 4d. No Drawings.]

A.D. 1866, August 29.—No. 2230.

DAVIS, JAMES.—“An improved method of treating limestone
“ and applying the products for purifying and rendering water
“ palatable, and for imparting a briskness to other beverages,
“ as also for utilizing the substances to the various purposes
“ of the builder.”

This invention relates to the purification of water containing vegetable and animal impurities by means of caustic alkali. After the alkali has been added to the water, the liberated gas is forced through the caustic solution so as to convert the soluble lime into an insoluble carbonate. The liquid is then allowed to percolate through sand, gravel, or vegetable charcoal, and is thereby rendered bright and limpid. More carbonic acid gas may now be added to it for the purpose of impregnating the clarified water with gas so as to render it brisk. Another part of this invention relates to “the production of materials suitable for ornamental objects and the
“ constructive designs of the architect and builder.”

[Printed, 4d. No Drawings.]

A.D. 1866, September 11.—No. 2331.

OLLEY, WILLIAM.—(*Provisional protection only.*)—“Im-
“ provements in apparatus for separating animal and vegetable
“ matters from water and other liquids.”

This apparatus consists of an outer globe or case and an inner globe or bag through which liquid passes from the vessel in which it is contained preparatory to being used. The outer globe is made of metal and communicates with the

vessel containing the liquid to be filtered. The inner bag is composed of horse hair, wire gauze, or similar material, and is fastened so as to form a separating bag within the outer globe for intercepting and separating insects or vegetable matters from the liquid passed through it.

[Printed, 4d. No Drawings.]

A.D. 1866, September 24.—No. 2451.

NEWTON, WILLIAM EDWARD.—(*A communication from Robert Stewart.*)—"Improvements in machinery or apparatus " for filtering liquids."

This invention relates to improvements on the well-known centrifugal filtering apparatus, in which the liquid to be filtered is forced outward through the filtering medium by centrifugal force induced by the rotation of the apparatus. It consists in constructing the apparatus so as to prevent the escape of vapour and the overflow of liquid during the distilling process. There is no communication in this machine with the interior of the centrifugal vessel except that afforded by the pipe through which the liquid is introduced into the inside and through the filtering chamber, through which the liquid is forced by centrifugal force due to the rotation of the apparatus. This invention also includes a disc or circular flange, which is employed to cause the liquid to enter the filtering chamber at a suitable elevated point to compensate for gravitation, which influences the liquid in its passage through the filtering medium.

[Printed, 8d. Drawing.]

A.D. 1866, October 1.—No. 2525.

HODGE, PAUL RAPSEY.—"Improvements in apparatus for " the filtration of fluids."

In the improved filter the process is a double one, water being filtered, first, by the pressure of the column used, and second, by a descending column, which effects a second filtration. The media through which filtration takes place, are, first, any fibrous material stretched over a frame, second, a chemically prepared medium, gravel, and carbon. The chemically prepared medium consists of vegetable or animal fibre saturated with tannin or solutions of tannin and iron. Fibrous or woody matter may also be employed after having

been treated so as to become protochloride or a perchloride of iron. A revolving brush is provided for cleansing the first named medium.

The drawings show various forms of this filter. Two cistern filters are set forth; one with the bag uppermost, the other with the bag underneath. A filter upon this principle for the supply of towns is shown; this filter may be cleansed by a jet of steam or boiling water and then with cold water.

[Printed, 1s. 8d. Drawings.]

A.D. 1866, November 21.—No. 3055.

WAHAB, CHARLES JAMES.—(*Provisional protection only.*)—
“Improvements in purifying polluted water.”

This invention “consists essentially in applying the substances employed by grinding or reducing the same by any convenient or suitable mechanical contrivance in a stream of water to be purified.” “Any description of grinding or reducing apparatus may be employed, provided only that it can be made to work under water and is capable of crushing the substance to powder. It may consist of heavy rollers (as in a ‘pug’ mill), or rubbing surfaces (as in a flour mill); or a pounding or disintegrating apparatus, or indeed any means whatever by which the substance is reduced to powder in the water.”

[Printed, 4d. No Drawings.]

A.D. 1866, December 1.—No. 3165.

BROWNING, SAMUEL JOHN.—“Improvements in the methods of applying and arranging apparatus for distilling sea water, and also in the mode or method of combining and using such apparatus for that and other purposes.”

The said distilling apparatus is adapted to existing galleys or cooking apparatus and to the heating apparatus employed on board ship.

Above the hot plate, or between the fire and the flue pipe, or above the cook house, is placed a case containing tubes. By means of these tubes, the products of combustion act upon the salt water contained in the case so as to heat it, the heat being applied either internally to the tubes or externally to them. The ordinary fresh water boiler is placed behind the said case, and the flues are arranged accordingly.

A series of pipes, placed beneath the hot plate, may be connected with the tubes in the above-mentioned tubular water box. These horizontal pipes are acted upon directly by the fire, and materially increase the steam generating surface of the apparatus. Dampers regulate the heat, either solely, or partially, or not at all, upon the salt water distilling apparatus.

Heating stoves for sea-going ships are constructed with a double casing and tubes for vaporizing salt water.

A high pressure steam generating apparatus may in like manner be constructed in connection with a cooking stove.

A weighted or spring escape valve is placed in salt water boilers, so that no brine or salt deposit is carried over with the steam.

[Printed, 8d. Drawing.]

A. D. 1866, December 22.—No. 3380.

WAHAB, CHARLES JAMES.—(*Provisional protection only.*)—

“Improvements in apparatus for filtering or straining liquids,
“and for washing and wringing cloth, rags, and similar textile
“and fibrous substances.”

“This apparatus consists in every case of a hollow cylinder
“which is caused to revolve on its axis, and inside of it there
“is a spiral blade (or blades) which cause the substances to
“be purified or wrung to traverse horizontally through the
“cylinder.” “For filtering water the inside of the hollow
“cylinder should be lined with very fine wire cloth which will
“form the filtering medium, and the spiral blade may be kept
“stationary inside of it, and should be armed along its edge
“with a soft brush like a fringe,” “which will keep the filter-
“ing medium clean and unobstructed. For washing and
“wringing the cylinder must be covered (internally) with
“wire cloth or netting for a much larger mesh.”

[Printed, 4d. No Drawings.]

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 Middlewich (*Literary and Scientific Institution*).
 Modbury (*Mechanics' Institution*).
 Mossley (*Mechanics' Institute*).
 Newark (*Mechanics' Institute*).
 Newbury (*Literary and Scientific Institution*).
 Newcastle-upon-Tyne (*Mechanics' Institution*).
 — (*Working Men's Club*).
 New Mills, near Stockport (*Mechanics' Institute*).
 Newport, Isle of Wight (*Young Men's Society and Reading Room*).
 Northampton (*Mechanics' Institute*).
 North Shields (*Free Library*).
 Nottingham (*Mechanics' Institution*).
 — (*Subscription Library, Bromley House*).
 Oldham (*Mechanics' Institution, Werneeth*).
 Ormskirk (*Public Library*).
 Oswestry (*Institute*).
 Over, Cheshire (*Working Men's Institute*).
 Oxford (*North Oxford Working Men's Club*).
 Patricroft (*Mechanics' Institution*).
 Pembroke Dock (*Mechanics' Institute*).
 Pendleton (*Mechanics' Institution*).

Penzance (*Institute*).
 ——— (*Penzance Library*).
 ——— (*Working Men's Association*).
 Perth (*Mechanics' Library, High Street*).
 Peterborough (*Mechanics' Institution*).
 Plymouth (*Working Men's Institute*).
 Pontypool (*Literary Institute*).
 Poole (*Literary and Scientific Institution*).
 ——— (*Mechanics' Institute*).
 Port Glasgow (*Public Library*).
 Portsea Island (*Young Men's Christian Association*).
 Preston (*Institution for the Diffusion of Knowledge*).
 Redruth (*Redruth Institution*).
 Reigate (*Mechanics' Institution*).
 Richmond (*Working Men's College*).
 Rotherham (*Rotherham and Masbro' Literary and Mechanics' Institute*).
 Royston (*Institute*).
 Rusholme (*Public Hall and Library*).
 Ryde, Isle of Wight (*Philosophical and Scientific Society*).
 ——— (*Young Men's Christian Association and Literary Institute*).
 Saffron Walden (*Literary and Scientific Institution*).
 St. Just (*Institution*).
 St. Leonards (*Mechanics' Institution*).
 ——— (*Working Men's Club*).
 Salford (*Working Men's Club*).
 Salisbury (*Literary and Scientific Institution*).
 Saltaire (*Literary Institute*).
 Scarborough (*Mechanics' and Literary Institute, Vernon Place*).
 Selby (*Mechanics' Institute*).
 Sevenoaks (*Literary and Scientific Institution*).
 Shaftesbury (*Literary Institution*).
 Sheerness (*Literary Institute*).
 Sheffield (*Branch Free Library*).
 ——— (*Brightside Branch Library*).
 ——— (*Literary and Philosophical Society, School of Arts*).
 ——— (*Mechanics' Institution*).
 Shepton Mallet (*Reading and Mutual Improvement Society*).
 Sidmouth (*Mechanics' Hall*).
 Skipton, Yorkshire (*Mechanics' Institute*).
 Slough (*Mechanics' Institute*).
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 Southampton (*Polytechnic Institution*).
 ——— (*Workmen's Hall*).
 Southport (*Athenæum*).
 South Shields (*Public Free Library*).
 Southwell (*Literary Institution*).
 Spalding (*Christian Young Men's Association*).
 ——— (*Mechanics' Institute*).
 Stafford (*Mechanics' Institution*).
 Staines (*Literary and Scientific Institution*).

Staines (*Mechanics' Institute and Reading Room*).
 Stalybridge, Cheshire (*Mechanics' Institution*).
 Stamford (*Institution*).
 Stourbridge (*Associated Institute*).
 ——— (*Church of England Association*).
 ——— (*Iron Works Reading Room and Library*).
 ——— (*Mechanics' Institution*).
 ——— (*Working Men's Institute*).
 Stowmarket (*Literary Institution*).
 Stratford (*Working Men's Hall*).
 Sudbury, Suffolk (*Literary and Mechanics' Institute*).
 Sunderland (*Working Men's Club*).
 Swansea (*Royal Institution of South Wales*).
 ——— (*South Wales Institute of Engineers*).
 ——— (*Working Man's Institute*).
 Tavistock (*Mechanics' Institute*).
 ——— (*Public Library*).
 Thornton, near Bradford (*Mechanics' Institute*).
 Thornton Heath, Croydon (*Workmen's Club*).
 Todmorden (*Mechanics' Institution*).
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 ——— (*Institution*).
 ——— (*Royal Institution of Cornwall*).
 Tunbridge (*Literary and Scientific Institution*).
 ——— (*Mechanics' Institute*).
 Tunbridge Wells (*Mechanics' Institution*).
 ——— (*Society of Literature and Science*).
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 Uttoxeter (*Mechanics' Literary Institute*).
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 Wallingford (*Free Library and Literary Institute*).
 Walsall (*Free Library*).
 Walsham-le-Willows, Suffolk (*Institute*).
 Ware (*Institute*).
 Warminster (*Athenæum*).
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 ——— (*Public Library*).
 Wellingborough (*Working Men's Club*).
 Wellington (*Young Men's Christian Association*).
 Wells, Somerset (*Young Men's Society*).
 West Bromwich (*Free Library*).
 Whaleybridge (*Mechanics' Institute*).
 Whitby (*Institute*).
 ——— (*Museum*).
 ——— (*Subscription Library*).
 Whitehaven (*Mechanics' Institute*).
 ——— (*Working Men's Reading Room*).

Whitstable (*Institute*).
 Wilton (*Literary Institute*).
 Winchester (*Mechanics' Institution*).
 ——— (*Training College*).
 Winsford (*Town Hall Reading Room*).
 Wirksworth (*Mechanics' Institution*).
 Wisbeach (*Mechanics' Institute*).
 Witham (*Literary Institution*).
 Witney (*Athenæum*).
 Wolverhampton (*Law Library*).
 ——— (*Library*).
 Wolverton (*Institute*).
 Woodbridge (*Literary and Mechanics' Institute*).

Worcester (*Railway Literary Institute*).
 ——— (*Workman's Hall*).
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